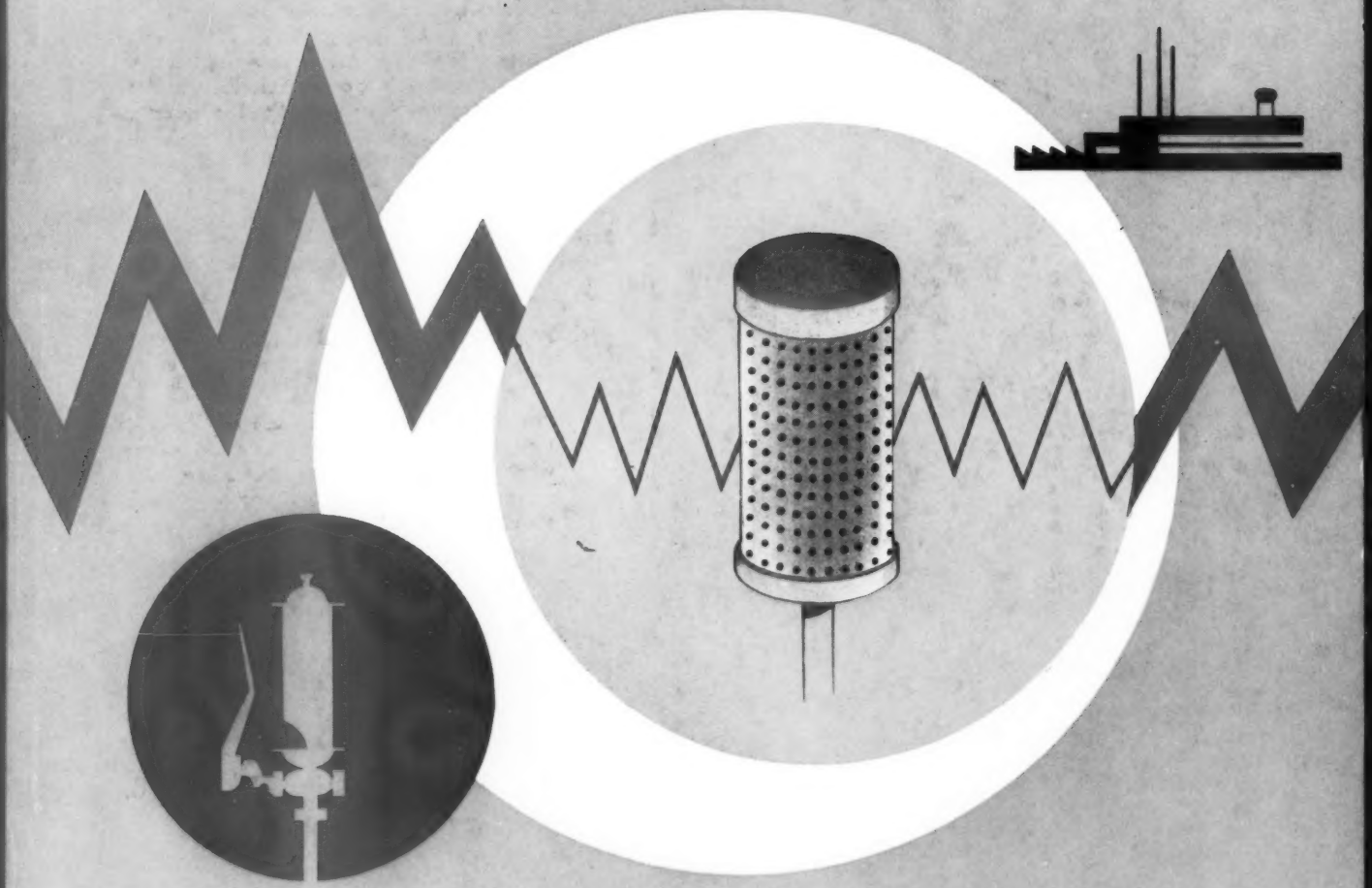
A HITCHCOCK PUBLICATION

assembly & fastener ENGINEERING



AUGUST · 1959

In this issue: **Muffle Noise and Boost Efficiency**
The Application of Welded Fasteners—Part 2
Consideration for Solid Pins in Product Design

Request . . . research . . . results

This man is solving a fastener problem

the Pheoll *way!*

The *ingenuity* with which fastener problems are solved at Pheoll ranges far beyond the men in the plant. For just as scouts precede a task force, so do Pheoll sales engineers travel the country, bringing you the latest news in fastener developments . . . answering your inquiries . . . counseling on your needs. Your fastener problems are reported to headquarters for study and analysis . . . and then cleared up with the quiet certainty that comes with years of experience. This unique specialization, combined with the characteristic Pheoll willingness to *try*, helps to explain why Pheoll is the outstanding name in solving the fastener problems of industry. If *you* have a fastener problem, direct a *request* to your Pheoll field representative. He'll *research* it . . . and soon will return with positive *results*, guaranteed by Pheoll!

The MAN in the photograph, by the way, is Frank Mears, Consumer Sales Manager, whose staff of engineers carries the latest news to you. Frank is in charge of all consumer sales . . . a 16 year expert . . . at Pheoll!

PHEOLL

P

Pheoll Manufacturing Co., Inc.

Industrial Fastener Division

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assembly & fastener ENGINEERING

August, 1959 Volume 1, Number 11

FEATURES

Business Sees "Red" Overseas! 7
The crucial task of containing Russia's new economic brand of aggression.

Muffle Noise and Boost Efficiency 24
Here's how engineers at Duncan Electric provide the low noise level so necessary in the assembly of watt-hour meters.

Let's Consider Applications of Solid Pins 28
A discussion of uses for straight, tapered and grooved pins, with emphasis on the latter.

The Application of Weld Fasteners—Part 2 33
A guide to setting-up, controlling the weld, and avoiding some common mistakes.

Fasteners Serve as TV Components 39
Spring steel clips serve multi-purpose in Liberty's new all-channel step-tuner.

Semi-Automated Assembly for Computer Circuitry 42
Librascope has developed techniques which permit production rates formerly thought unobtainable.

Fastener School One of Best in Industry 46
Distributor salesmen get both practical and theoretical experience in problem-solving.

Fasteners for Color Matching and Coding 49
Painted fasteners are now available to suit specific needs of product designers.

DEPARTMENTS

2 **Letters to the Editor**
5 **The Editor's View**
8 **Business Notes**
11 **Industry at Work**
15 **Assembly & Fastening Ideas**
21 **Reports from the Field**
51 **What's New in Equipment**
59 **What's New in Fastening**
69 **Useful Literature**
73 **Industry Makes News**
82 **One Last Word**

Subscription rates: $6.00 per year in U.S.A. $7.50 per year elsewhere.

Phone MO 5-1000. Cable address: HITCHPUB. Accepted as controlled circulation publication at Pontiac, Illinois.

• Not only can noise produce trouble on the assembly line, it can also hide trouble. How engineers at Duncan Electric keep noise muffled is told in article starting on page 24.

Letters to the Editor

New Fastening Technique

I have just finished reading your article entitled "New Fastening Technique Eliminates Deep Drawing" in your June issue. As brief as this article was, it was most informative, and I for one am most appreciative.

As it may be possible for us to use this type of corner fastener in some of our products, I would appreciate your advising me of the proper people to contact for the corner extrusion.

Ray A. Plante
Chief Designer
Fram Corporation
Providence, R.I.

Automate or Die

Your editorial "Automate or Die" in the June issue has received so many complimentary comments that we would appreciate receiving 100 reproductions of it.

M. A. MacDonald
President
Clyde Engineering & Mfg. Corp.
Hazel Park, Michigan

Interlocking Tape Fastener

In reading one of your recent issues, our Research & Development Department became interested in an article concerning interlocking nylon tape fasteners made by Velcro Sales Corporation. However, the writer was unable to locate the address, and trust that you will forward this inquiry to the party concerned.

C. B. Fry
Asst. Purchasing Agent.
Steel Heddle Mfg. Co.
Greenville, S. Carolina

Helping the Handicapped

Your editorial regarding handicapped workers was of great interest since I have been interested in helping the blind and visually handicapped people here learn of methods of assembly that will enable them to do more than they now realize. Though progress is slow I have been able to acquaint them with "feel torquing."

Thanks for publishing this excellent magazine with its educational ads, articles and editorial comments.

William A. Klinger
Sales Engineer
Milwaukee, Wisconsin

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Eliminate Tapping . . .

. . . An ideal fastening for fixed bolt or stud requirements in thick or thin sheet metals, extrusions, castings, etc.

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. . . Eliminates soldering bolts to sheet metal.

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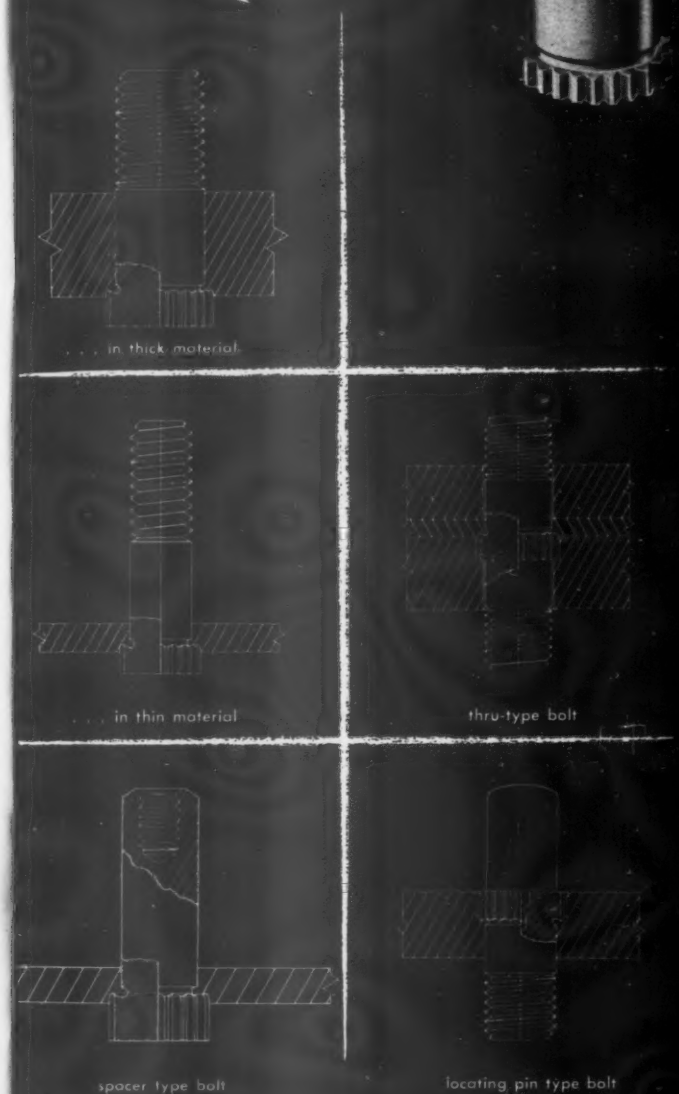
. . . For any fastening requirement specify ROSAN INC. . . .



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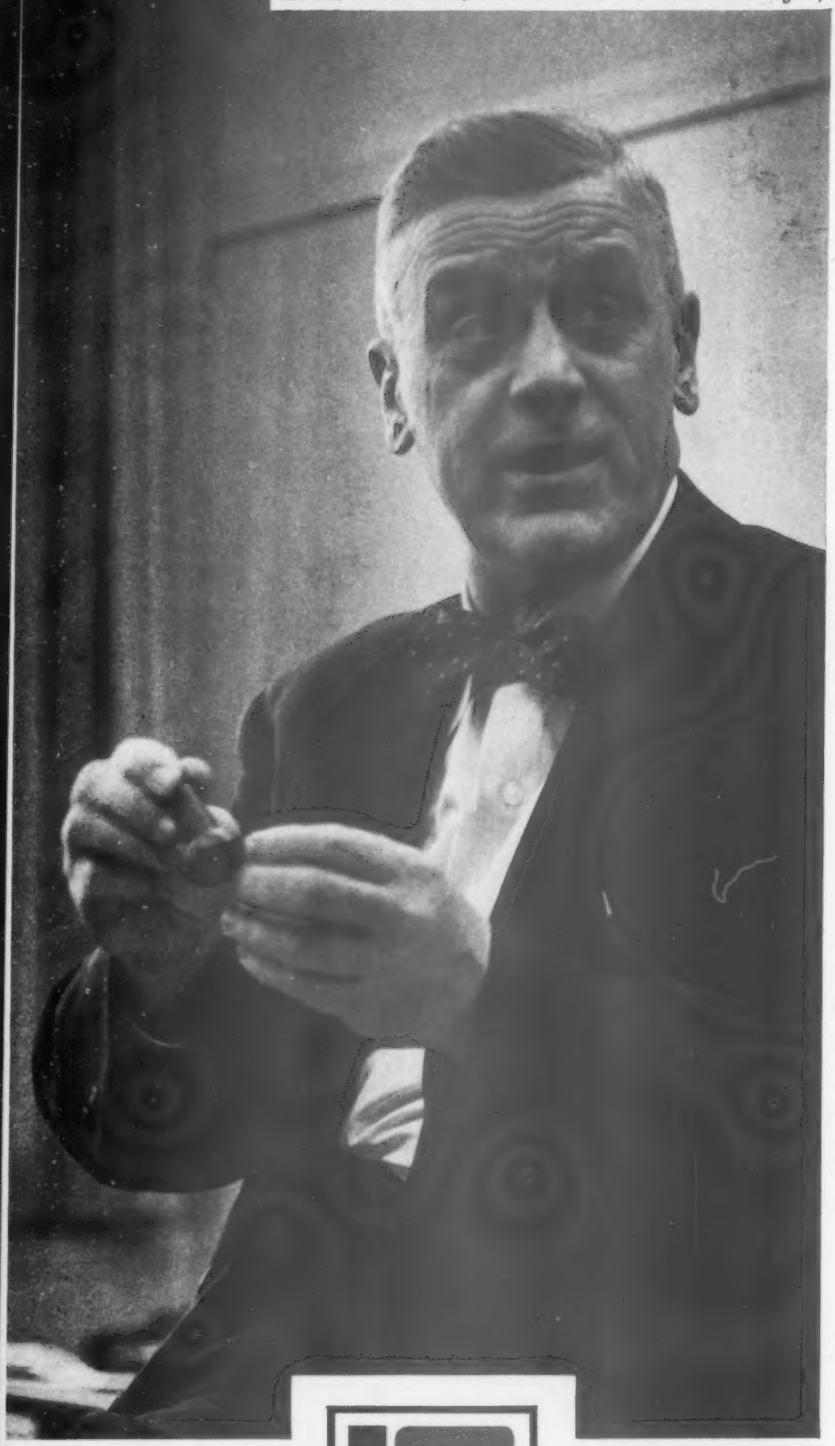
E. H. WERNER, *Production Control Manager, Lamson & Sessions, tells why...*



It's costly to be close-mouthed in ordering fasteners

THE more "specifics" you give us about your fastener needs, the more headaches and money we can save you. For example:

What quantity is required . . . and when? To give you economical production runs, using the most efficient tooling methods, we need specific information. Give us *realistic* quantities — how many must be shipped by a given time—what you expect future usage to be—delivery intervals required. This gives you maximum economy.

What are the physical requirements? Give us the "physicals" and let us recommend the suitable material. When prints specify a steel not commonly used, it must often be procured at a premium, which adds to your cost.

What are the critical dimensions? Close tolerances invariably add to cost. If you indicate which non-critical dimensions might be modified—radii, angles, fillets, lengths, outside and inside diameters, concentricity, etc.—we can often eliminate expensive secondary operations.

What quality level is required? This determines whether 100% inspection is necessary, sample inspection is adequate, or only certain dimensions must be inspected.

Take advantage of the specialized experience and facilities available to you through L&S, to save money and headaches on fastener buying.

L & S Fastener Engineering helps you "tighten up" on...

- PURCHASING COSTS
- INSPECTION AND HANDLING COSTS
- ASSEMBLY COSTS

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AUGUST, 1959 VOL. 1, NO. 11

DON'T COMPROMISE WITH QUALITY CONTROL

Several months ago we discussed the matter of manufacturing products designed to last a lifetime. Such a span of reliability would seem out of reach for any consumer product, except that we remember the old family refrigerator which lasted 19 years without any major repairs. It was finally traded in on a new one when the kitchen was modernized. But for all we know, this porcelain-white kitchen necessity may be in its third decade of providing reliable refrigeration for some family's perishable foods.

But to get such reliability, there can be no compromise on customer satisfaction, and this is directly related to quality control.

Ask laundry appliance leader Fred Maytag II why his company's sales were up last year while overall industry sales were down, or why Maytag's sales this year are running way above the average of the rest of industry. He will attribute a lot to continued adherence to rigid quality control standards which has resulted in ever-growing customer satisfaction being passed down through three or more generations of users.

Mr. Maytag recently stated, "To achieve reliability in a product you first have to start with a basic concept of top management: a decision that you won't accept anything less than the best quality you can produce. This requires a steadfastness to avoid making compromises as you go along—even under the pressure of a backlog of orders and sales people wanting shipments."

With everyone at Maytag imbued with this concept, it is no wonder that the company has as its avowed goal: No major repair of product necessary for a 10-year period!

Not many companies would attempt to pioneer such a goal because they are more interested in today's quick sales than in one several years away. They forget that, if you give the customer satisfaction today, he will keep you in business tomorrow.

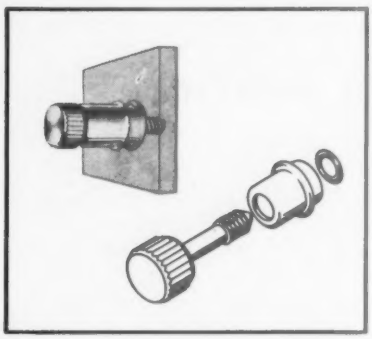
Matt E. Hendrickson

Managing Editor

Compact Captive Panel Screws:

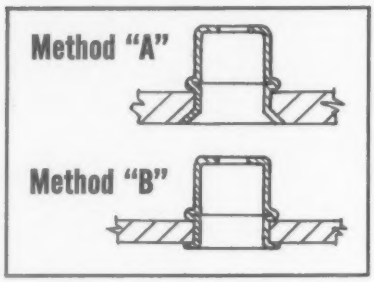
Standard Design Lowers Installed Costs

No longer is it necessary to resort to a costly fastening device of special design to provide quick attachment and release of electronic components. Standard Southco Retractable Screw Fasteners (stand-off thumb screws), available from stock, are both fast to install and economical. The five sizes,

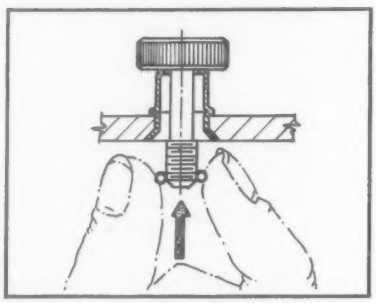


shown below, meet a very wide variety of requirements.

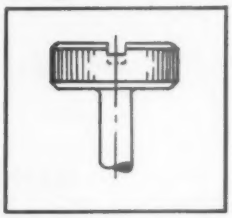
Check these advantages of simplified Southco Captive Panel Screws. Even when many screws are in one panel, misalignment is easily handled because the screw floats in a large hole in the stand-off, allowing ample play for "lining up." No special tools are



needed for installation, thus production is not subject to tool failure, nor limited by either the number of special tools available or the number of personnel trained in their use.



The Southco No. 58 Retractable Screw Fastener consists of three parts: thumb screw, stand-off, and retaining ring. The bright nickel-plated brass stand-off is inserted in either a drilled and countersunk hole (Method A), or a drilled hole (Method B), and flared. The polished, chrome-finished brass screw is passed through the hole in the stand-off and made captive by a retaining ring. Engaging in a tapped hole



in the frame, the screw may be fully withdrawn without moving the panel, yet always is retained.

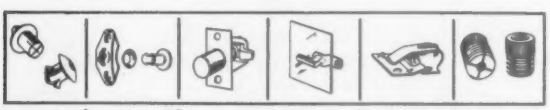
The unslotted screw is standard in 3/4", 9/16", and 7/16" head diameters and three thread sizes. Slotted head screws are also available in all sizes. The stand-off is standard in sizes to fit panel thicknesses from a minimum of 1/16" to a maximum of 17/64". Screw and stand-off are also obtainable in stainless steel.

MINIATURE TO LARGE SIZE HEADS IN FIVE TYPES

HEAD DIAMETER	3/4"	9/16"	9/16"	7/16"	7/16"
THREAD SIZE	1/4-20	1/4-20	12-24	10-24	10-32

Free Fastener Handbook

Send for your complete Southco Fastener Handbook, just printed. Write to Southco Division, South Chester Corporation, 257 Industrial Highway, Lester, Pa.



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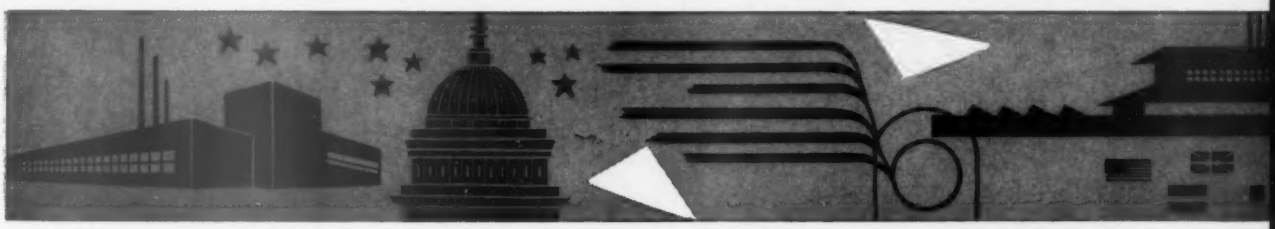
The State of Business



BUSINESS SEES "RED" OVERSEAS!

By **W. Jack Butler**
Arabian American Oil Company

No responsibility of American business today is more crucial than the task of containing Russia's new economic brand of aggression.

The USSR and surrounding Communist states are driving their economies hard. Now, with their industrial output expanding at more than double the U.S. rate, Red leaders have decided to launch a new kind of attack in their drive for world conquest.

Our government aid programs and our private charitable efforts are inadequate to meet the new challenge. Our business efforts abroad are meager and often fumbling. There is need for some tough-minded, imaginative thinking, and some new action.

At stake for the Western democracies are not only the political and social prospects of nearly half the world's people in areas especially vulnerable to Russian pressures and blandishments, but also trade routes, markets, vast mineral reserves, military bases, communications systems and the oil energy sources of Western Europe.

How does the Kremlin bring its economic power into action to establish control?

It first picks its target areas skillfully. South Asia and Africa provide promising opportunities because nations there are politically unstable and the cultural standards of the people have been shattered by war, superimposed technology, and inadequately absorbed Western social values.

Trained, dedicated Red agents move in and recruit local leadership for propaganda and organizational duties.

Hundreds of engineers, industrial managers, trade experts come to peddle "opportunities" to these progress-hungry nations. The Russians offer an all-inclusive, carefully planned package. As one American businessman in New Delhi said: "I don't see how we can compete with the state-sponsored, industrial management teams the Russians are exporting. They are presenting a full range of services, nicely tailored to the national aspirations of these people."

The degree of success or failure that Russia—or the West—is experiencing at any stage in a long-range program is hard to measure. In some cases, you never know how things are going until one morning you wake up and the Communists have taken over.

What can American business do? There are two general areas: (a) participation in a new kind of foreign aid program and (b) the establishment of overseas operations with positive, constructive policies.

Here are some of the requirements that must be met in any forward-looking program:

(1) The program must encourage a way of life abroad that is compatible with—though not necessarily a mirror of—our American system. We must demonstrate that a society that upholds individual freedom respresents the most attractive route to a better life.

W. JACK BUTLER
Aramco Public Relations
Dhahran, Arabia

Harvard Business School graduate W. J. Butler has lived and worked in Saudi Arabia for eight years as public relations manager for Aramco. He served as a lieutenant commander in the U.S. Navy.

(2) We must energize the creative abilities and existing skills of people abroad and transform them into constructive achievements. There must be less advice and knowledge-spreading and more practical help in seizing opportunities.

(3) People must be assisted in building up the basic, enterprise-generating industries which they want and need. Capital must be invested in industries that hatch other industries: electric power, chemicals, railroads, communications.

(4) The level of management skills among local businessmen must be raised. This must be done out-

continued

side the ranks of the wealthy.

To meet these requirements, government and business must cooperate in a new foreign aid effort in a "management assistance program." The method might be:

(1) International Co-operation Administration representatives could develop and energize opportunities among local businessmen.

(2) U.S. management teams not only could advise, but also organize and operate companies. Drawn from U.S. corporations or consulting firms, the teams could be financed on a cost-plus-fixed-fee basis as are defense contracts.

(3) U.S. Government capital could be made available to foreign businessmen at low interest rates to supplement private capital. In this area, government planners should evaluate the potential of subsidy-lending. Heretofore, aid has been largely outright grants or reasonably sound business loans. In terms of our national objective to counter Communism, the U.S. could arbitrarily assign percentage losses it would be willing to take on loans to various parts of the world. In this way a considerable part of funds previously earmarked as grants could turn over and go farther.

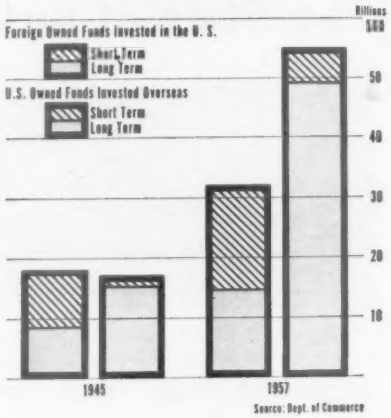
(4) Companies set up under this program could be permitted to purchase material and equipment from Western Europe and Japan.

American business has been reluctant to go abroad. The hazards are great, the headaches many, and the opportunities at home are substantial. Now the time has come for a re-examination of this attitude.

It is, of course, too much to ask management to move into the foreign field without some reasonable assurance of economic success. U.S. Government guarantees are a necessity.

The lack of this backing has crippled American companies in South Asia where they have had to compete with West European firms strongly supported by their governments. This contributed to Ford and General Motors decisions to pull out of India, and led Pan American to relinquish its equity in Middle East Airlines. The state-supported efforts of the Communists are even more difficult to match.

Investment Overseas



Source: Dept. of Commerce

Given reasonable backing, American business will search out opportunities overseas. However, investing is not enough. Equally important is what we do when we get there: policies, goals, performance. •

(To be concluded next month.)

Industrial Briefs

Strike hedge buying as a July 31 wage deadline nears, led Reynolds to up aluminum output to 100% of rated capacity . . . But with copper prices slipping, Westerners are fighting Administration attempts to market $4 billion in stockpiled metals and materials . . . Through late June: auto production up 1.1 million over '58 period, topped by Chevy, 892,767, and Ford, 830,786. Total sales leveling at 19,500 a day, but optimism is strong for six million American-built sales year . . . Industrial prices are expected to record a 3% rise in '59 over '58, spurred by a predicted $3-4 per ton increase in steel. This in the face of record foreign imports of $14.3 billion, a 14% gain over '58 . . . Frozen foods will soon appear in boilable plastic bags . . . For every defense dollar the Nation spends one penny for cancer study, a disease yet to victimize 40 million unsuspecting present living. •

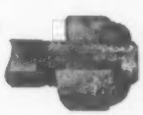
WHY DID THIS BOLT FALL OFF?

Where is the culprit . . . the nut whose function was to keep the bolt securely in place? Undoubtedly it fell off earlier . . . loosened by vibration . . . or unexpectedly high shock loads due, perhaps, to a careless operator. In any event, the bolt was pounded into uselessness . . . and failed. Chances are that the equipment the bolt and nut were part of is temporarily useless too.

Why then, was an inadequate fastener applied in the first place? Perhaps because "bolts and nuts" are often overlooked or specified routinely. Perhaps to save a fraction of a cent. Whatever the reason, the end result was inefficient and uneconomical. The nut failed—the fastening failed—and the product failed.

It could have been prevented. An Elastic Stop® nut would have held on. The small extra cost of the *best* self-locking nut would have solved this case . . . saved repair bills . . . downtime . . . and a manufacturer's reputation.

For detailed photos showing how some of America's foremost manufacturers of heavy equipment have insured critical bolted connections with Elastic Stop nuts on such units as rock drills, scrapers, snow plows, off-the-road trucks . . . write to ESNA. Or, for first hand proof, tell us the preferred size and we'll send you test samples. Address: Dept. S35-897 Elastic Stop Nut Corporation of America, 2330 Vauxhall Road, Union, New Jersey.



DOUBLE DEPENDABILITY

The dependability built into every Elastic Stop nut builds itself into the dependability of every product on which it is used.

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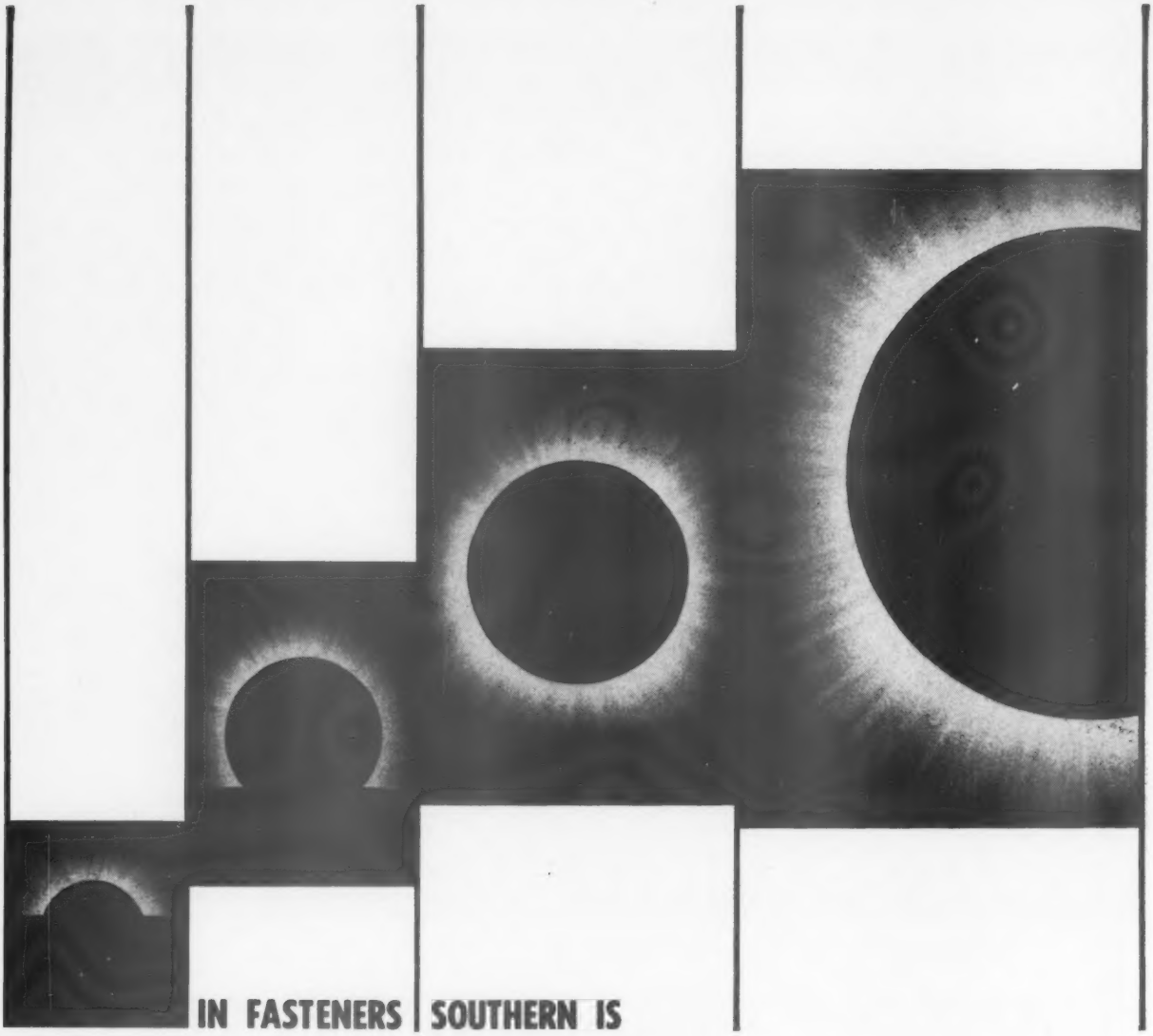
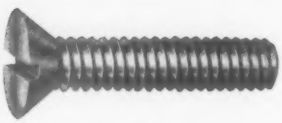


IN FASTENERS SOUTHERN IS

RELIABLE



Reliability is the most important product Southern Screw offers its customers. From the receipt of your order through shipment, **reliability** is the important but invisible quality that has built Southern Screw's acceptance over the past twelve years. If **reliability** is one of the unseen but invaluable components of your product, get in touch with Southern Screw about your requirements and our quotation on quality screws, shipped on schedule!

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Industry at Work

RUSSIANS WATCH AMAZED: LOCKBOLT FASTENING SPEEDS DOME ERECTION

Kaiser Aluminum's 130-foot high dome will house part of the American National Exposition.

Fifty-one thousand locking bolts are holding together Kaiser Aluminum's gold anodized dome in Moscow.

The geodesic structure, largest aluminum dome yet built, was erected in May amidst widespread Russian interest, including a personal visit by Premier Nikita S. Khrushchev. The 200-foot diameter dome will house part of the American National Exhibition from Aug. 2 to Sept. 13.

According to Kaiser design engineer Robert K. Richter, who served as consultant on the project, one of the most talked about construction techniques was the use of locking fasteners and pneumatic pull guns to automatically secure the bolts.

Supplied by the Townsend Company, of Ellwood City, Pa., the aluminum alloy two-piece fasteners consist of a headed, threaded pin and collar. The pin is inserted through a hole from one side of the work and the collar is placed flush to the work and over the threads from the other side.

When a special air-gun is applied, its chuck jaws engage the pull grooves of the projecting pin tail. Depressing the trigger pulls the pin, draws the metal sheets together, swages the collar into the threads and breaks the pin in tension at the breakneck groove.

A line of bolts was stitched along the flanges of each of the dome's supporting struts, joining the struts inside the dome to the diamond-shaped panels. The brazier-headed, 3/8" bolts were also used to fasten the hub and gusset castings.

According to Richter, the bolts have the advantage of being especially tight-fitting in this type of close-tolerance building where holes are made undersize. The method permitted the dome to be erected in 20 days.

Erection of the 30,000 sq. ft. dome was done by 55 Russian workmen, supervised by Kaiser Aluminum's franchised fabricator-erector, Lydick Roofing Co. of Ft. Worth, Tex.

The dome was formed around a 130-foot mast equipped with rigging at the center of the dome's floor. After a ring of panels was applied, these were lifted to a sufficient height to allow installation of

continued

• The first use of lockbolts in the erection of geodesic domes was in January, 1957, in Hawaii. More than 19,000 such fasteners, supplied by the Huck Manufacturing Company, of Detroit, were installed in the Kaiser dome in Waikiki. A 38-man crew erected the 48-foot high dome in two working days. It was 152 feet in diameter. Later the same year another dome was erected at Virginia Beach, Virginia, using more than 20,000 of these Huckbolts.

WATCH FOR OUR ANNIVERSARY ISSUE

October will mark the first anniversary issue of ASSEMBLY & FASTENER ENGINEERING. Along with our regular editorial features, we plan to present a review of the types of articles you readers feel will be of the most help in your work. This review will be based on comments penned on your reader service cards, your letters to us, and our own editorial surveys. Included will be a complete index of articles published in the preceding 12 months, a roundup of major new developments in equipment and fastening materials, plus a review of the past year's most popular new literature.

another perimeter of panels. This section was then lifted for a third set of panels, and so on until the dome was raised. The clear span dome was then lowered and anchored to concrete piers spaced around the circumference of the floor.

Russian workmen install one of 1100 gold anodized panels shipped flat to Moscow and fastened together with lockbolts. Panels were added in rows.

Soviet Premier Khrushchev paid a surprise visit to the construction site in Sokolniki Park.

The dome weighs only 104,000 lbs. The diamond panels range from 11½′ long and 7′ wide, weighing 65 lbs., down to 9′ by 5½′, weighing 41 lbs. These are 14 sizes of panels in all.

Geodesic principles were developed by R. Buckminster Fuller.

300-HP GAS TURBINE ENGINE RIVALS DIESEL IN ECONOMY

Ford has developed a supercharged gas turbine engine of 300 horsepower. The 704 weighs only one-fourth that of a truck diesel engine of comparable horsepower while its fuel economy rivals a diesel.

To date, experimental gas turbines have employed one stage of air compression. The Ford 704 has two—one a supercharging stage—enabling the engine to deliver more horsepower from a smaller size. Early designs have only one combustion chamber where the 704 has dual burners.

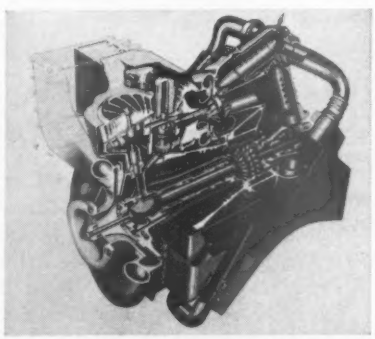
The 704 attains maximum fuel economy in a range of 20 to 100% of power. Earlier designs are efficient only when operating at full power, with fuel consumption rising sharply as power slides below the 100% level.

Exhaustive component testing has been carried out during development. The next step will be testing of the engine as a complete unit.

A wide variety of fuels can be used—unleaded gasoline, kerosene, jet engine fuel (JP4) or light diesel fuel—and no warm-up period is required.

Each compressor stage effects a four-to-one air compression. The low speed compressor turns at 46,500 revolutions per minute and the high speed at 91,500. Both the primary and re-heat combustion chambers operate at 1700°F. Exhaust gases are discharged at about 740° F, or roughly the same temperature as conventional passenger car engine exhaust.

Ford expects to be testing the new engines in vehicles before the end of the year.



Cutaway view of Ford's supercharged automotive gas turbine shows the low pressure compressor and turbine drive assembly, lower center; intercooler fan, upper left foreground; intercooler, extreme upper left; high pressure compressor, turbine and accessory drive, upper center; primary and secondary combustion chambers, upper right; exhaust heat exchanger, lower right; and power output turbine, right center.

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SPEED CLIP® lets MUFFIN-FAN® user change direction of airflow quickly...and saves 25% in mounting cost!

Some users set the Muffin-Fan, made by Rotron Manufacturing Company, to blow a cooling north-to-south breeze through their electronic or electrical equipment. Others want a south-to-north breeze. Both are readily pleased . . . the ingenious Tinnerman SPEED CLIP that holds the fan in its frame permits quick snap-out and snap-in to reverse the direction of airflow.

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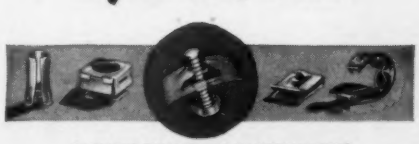

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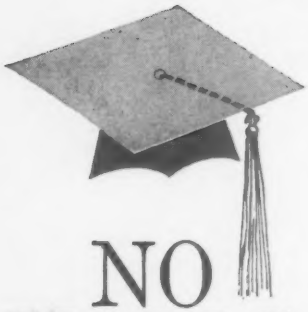

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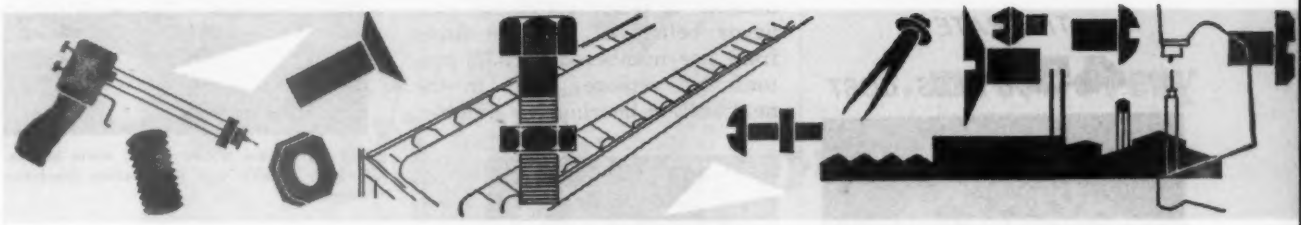
Assembly and Fastening Ideas

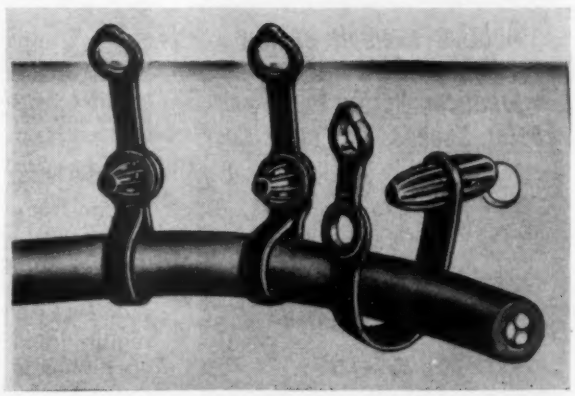


NEW FASTENING METHOD: LOCKING FLUTES

While developing a small nylon tip jack for electrical panel mounting, designers at Whitso, Inc., Schiller Park, Ill., considered the possibility of incorporating some type of self-mounting device.

As a result, the "Pushlock" principle—a self-locking press fit—was worked out. It makes use of molded flutes which extend radially from the body of the jack. When the component is pushed through a hole, the flutes deflect and create a holding action requiring 50 lbs. pull to release. The jack is mechanically inserted and eliminates the need for mounting threads, nuts and lock washers.

Other products followed the successful jack tip —miniature wire wrap terminals, plastic cable supports with a double stud at one end and casters. The ease of installation and simple action of this type of fastener should make it adaptable to many applications.



One example of the pushlock principle in use is this cable holder specified for a leading automobile. A double stud fits in the firewall or panel; the other end secures the adjustable plastic strap.

PRODUCTIVE IDEAS IN CONVEYORS

Productivity of girls assembling miniature units for record-players at Hornflowa Ltd., Maryport, Cumberland, England, has increased by the use of dividing bars in a conveyor belt (picture left). The conveyor has been divided into sections by angle-iron bars which halt the carriers containing the assemblies until the operator has completed her previous assembly and replaced it on the farther side of the bar. An added advantage of the system: impending bottlenecks are more quickly discernible.

Zig-zag pattern laid over a slat conveyor enables jars of warm liquid brilliantine to be cooled and solidified before they reach inspection point.

Two 6′ planks are cut into interlocking "dog-teeth," leaving room between the teeth for the jars

continued

to pass. The planks are not fastened down but are supported on the flanking benches so that they clear the belt by ½".

Pre-packed tubes of a medical product are efficiently cartoned by girls having a corresponding number to a section of the conveyor belt. Girl removes tubes from her numbered section, cartons and replaces them in the next section bearing her number.

Numbered conveyor sections for each packer permits easy output calculation.

Zig-zag pattern allows liquid, warm brilliantine to solidify and cool before inspection point.

Controlled conveyor speed allows time for cartoning and for each girl to have a short period of relaxation. Consequently, all girls work at the same speed and output may be calculated for any given period. Both ideas are in use at William R. Warner Ltd., Eastleigh, England.

AUTOMATIC FACILITY CUTS BRAZING TIME BY 90 PERCENT

High-frequency induction heaters associated with a new automatic brazing and soldering facility developed by Raytheon have reduced by 90% the time formerly required for brazing and soldering operations in production of Sparrow III missile components.

The new facility has cut brazing and soldering time from three minutes to 18 seconds in the production of missile gyroscopes and accelerometers.

According to L. C. Porter, Raytheon applications engineer, the rejection problem has practically been eliminated. Production tolerances can be held and temperatures closely controlled within a total range of 90 to 3000°F.

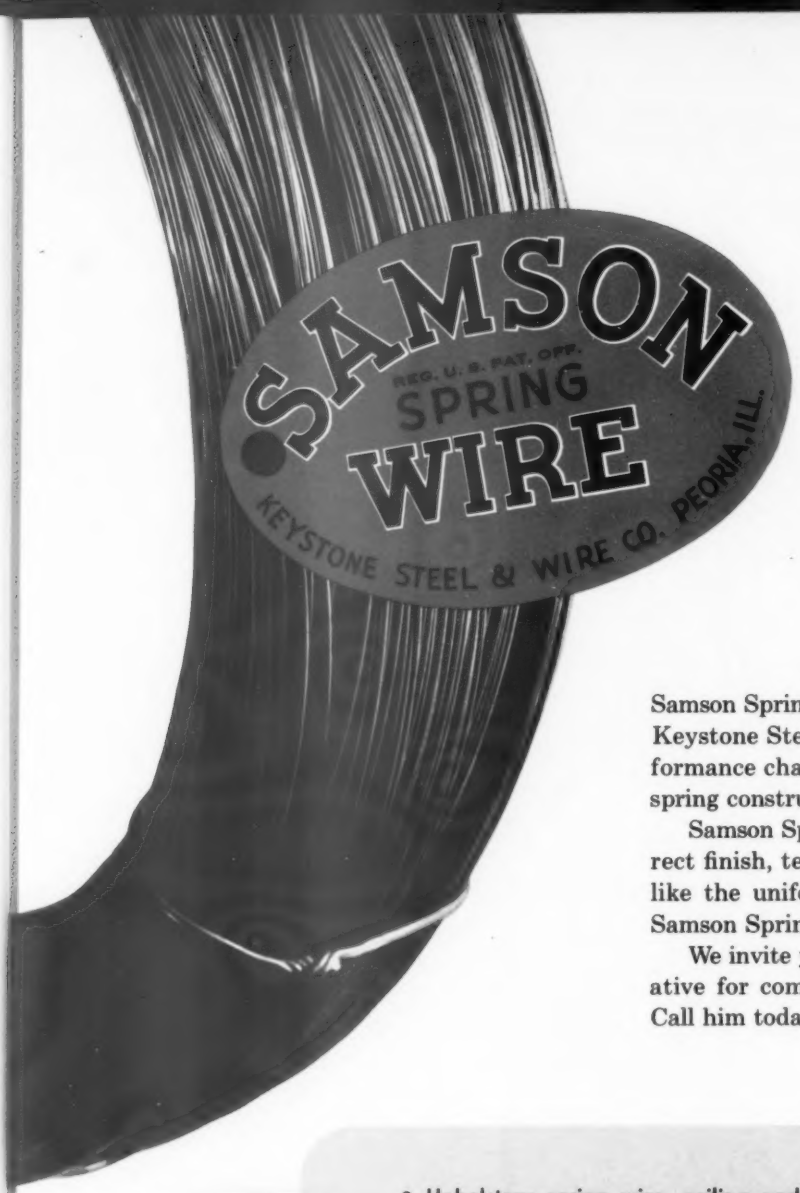
Raytheon's induction heating facility has speeded brazing time 90%.

Designed and built by General Electric's Industrial Heating Department, the heater has variable impedance output that can be matched to the load, rather than requiring that the load be matched to the fixed impedance of the heater.

This offers several practical advantages. In designing the induction heating coils used in the fixtures, it is no longer necessary to compromise between a coil which gives the desired heat pattern and one which matches the induction heater. Instead, the coil is designed for optimum heat pattern, and the impedance of the induction heater is quickly matched to the load by means of a dial control. This saves design time and permits the use of interchangeable fixture components, which in turn reduces the number of units necessary and provides maximum system flexibility.

Raytheon's facility is designed to handle silver brazing, lead-tin alloy soldering, shrink fitting,

continued



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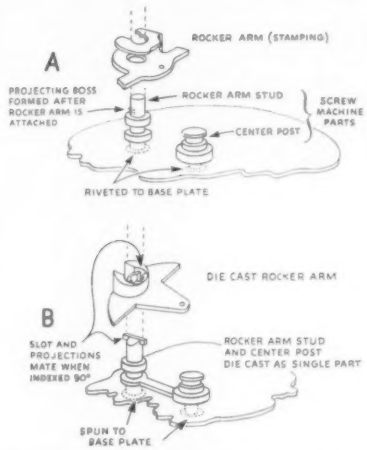
hardening, tempering and local stress removal in a controlled atmosphere. Brazing can be accomplished in a hydrogen atmosphere with a nitrogen purge after each operation.

All fixtures are of the plug-in type and were specially designed for the facility. Hose connections for the water cooling system are of the make-and-break variety. Power control from 0% to 100% is provided by a rheostat. Once two buttons have been simultaneously pressed to actuate the bell jar (to envelop the work area), all steps are automatically controlled at preset intervals by the timer which forms a part of the G-E auxiliary control panel mounted on each table.

DIE CAST PARTS EFFECT ASSEMBLY SAVINGS

Clarostat Mfg. Co., Inc., Dover, N. H., manufacturer of small switches, has achieved sizable production and assembly savings by replacing tiny stamped and machined parts with die castings.



Originally the switch's rocker arm was a stamping and the stud and post were made in screw machines. When studies indicated that a Gries Reproducer automatic, single-cavity die casting might effect savings, a trial run was made, and the die cast stud proved equally serviceable, and cost 40% less.

More attractive savings (53%) were made, however, by a design modification which combined the rocker arm stud and the center

post into a single casting.

In changing the switch design and manufacturing technique, Clarostat also gained dimensional uniformity from part to part. The resultant interchangeability made possible automatic assembly of the finished switch.

HOW ABOUT ULTRASONIC WELD INSPECTION?

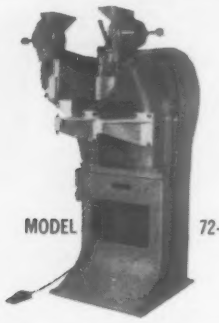
Rising quality control costs has stirred increased interest in ultrasonic weld inspection.

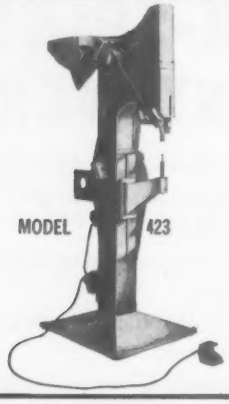
Detection, location and measurement of defects are the major requirements for weld inspection. The ultra-sound will reflect from any mechanical boundary. The greatest direct reflection will be obtained when the sound strikes a boundary at right angles to its plane. For typical plate and pipe welds, this requires the use of angle beam techniques.

Since all ultrasonic tests are comparative, it is necessary to have some reference or standard for comparison. Commonly a hole is drilled in either the part to be tested or in a separate piece of material of the same general size and flaw signals are compared. Through correlation with other non-destructive tests or destructive tests, the actual quality level for a given job can be varied depending on the particular requirements.

Studies at Sperry Products, Inc., Danbury, Conn. show that cost per unit length tested by ultrasonics is from one-half to one-fifth that of comparable X-ray inspection. These lesser costs are possible because of lower initial capital investment and the elimination of most of the material and processing costs associated with radiography.

Ultrasonic weld inspection eliminates the danger of radiation and the necessity of shielding. The inspection area does not have to be cleared interrupting other work. Normally, access to only one side of the material is required during the test thus making possible the testing of closed vessels. The portability of ultrasonic equipment, like Sperry's Reflectoscope, makes field testing and "in-place" tests feasible. •





HOW TO GET EFFICIENT ASSEMBLY AT LOW COST . . . AND GET A BONUS FREE!

Put together the most efficient cost-cutting production team in your plant by combining the proper rivet with the right rivet-setting machine. The bonus? The experience, the know-how, the expert help you get from Milford engineers. Not just any riveter will do . . . not just any rivet will do. The secret to maximum efficiency is working closely with Milford to find the right combination for your particular application.

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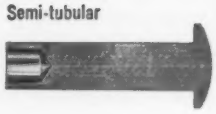
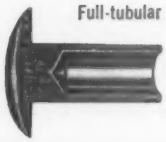


Full-tubular



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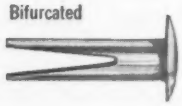
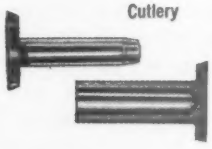
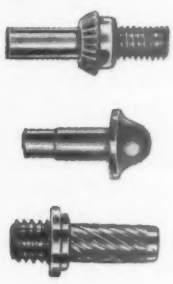


Cutlery



Specials



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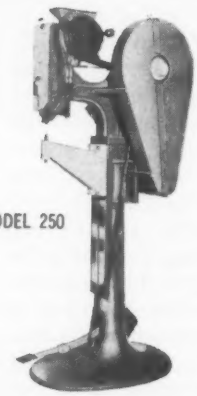

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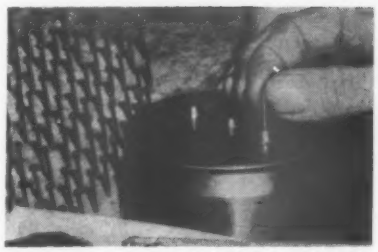


Rotor shafts for timing gears are dipped into adhesive through a control hole in a special applicator (above). Later, the bonded shaft and pinion gears are assembled into the rotor cage by an arbor press (below).

BONDING TIMING GEAR PARTS SAVES $56 PER THOUSAND

Assembling timing gears by bonding has saved the Haydon Division, General Time Corp., Torrington, Conn., some $56 per thousand assemblies.

Small pinion gears are joined to rotor shafts with a one-part, liquid, epoxy base adhesive supplied by Minnesota Mining & Mfg. Co., St. Paul, Minn.

The new method has reduced rejects and permitted a part design modification eliminating a secondary operation. It has eliminated the need for 100% inspection of shafts for distortion, a problem with former high-heat fusion methods.

No adhesive bond failures of the timing gears occurred during laboratory life testing at high and low temperatures and at high humidity conditions.

3M's EC-1386 has good flexibility and provides high shear strengths without the need to add an accelerator or catalyst. Average shear strengths range from 4670 psi at room temperature to 4630 psi at 180°F.

This non-volatile adhesive provides unlimited working life. It is designed for metal bonding applications subjected to service temperatures of from minus 67°F to plus 250°F.

The rotor shaft is first dipped in the EC-1386 adhesive through a control hole in a special applicator, measuring the correct amount of adhesive to the shaft.

The pinion gear is then pressed in place on the adhesive coated rotor shaft by a foot press.

The assemblies are then dried on a rack and cured for one hour in an oven at a temperature of 350°F. The resulting bond yields shear strengths over 4500 psi.

After the bonding operation has been completed, the gear and shaft are assembled through the timing motor bearings into the rotor cage by a hand arbor press.

CARBIDE TAPPED HOLES SPEED STUD INSTALLATION

A trial-and-error method of installing studs in the main housing pad of a jet engine fuel pump was eliminated by tapping holes with carbide taps.

At the same time Chandler-Evans Corp. of West Hartford, Conn., increased its tap life from 80 holes maximum with high speed steel to over 10,000 with carbides.

When HSS taps were used, it was often necessary to try several

continued

studs before finding one that would seat with proper torque. The ⅜"-16 three fluted Pratt & Whitney carbide tap produced over 10,000 holes within a range of 280-300 inch/lbs. of torque—well within tolerance.

The operation is performed on an Allen four-spindle drill press with leadscrew attachment. The work is anodized aluminum sand casting in which eight holes must be tapped within 160 to 400 inch/lbs. of torque (60 inch/lbs. is equivalent to .0001" tolerance.) Production is 43 castings per shift.

LIQUID POLYMER SOLVES SEALING PROBLEMS AT NORGREN

Pressure regulators are sealed against CO_2 in five places with a liquid plastic which hardens in the absence of air.

C. A. Norgren Company of Englewood, Colo., uses a liquid polymer seal against high pressure CO_2—up to 3000 psi—in their line of pressure regulators. According to Mr. A. W. Zmuda, chief engineer at Norgren, two previous difficulties have been eliminated. Joints sealed with Loctite can be broken for service without undue difficulty with the usual precautions taken to insure wrench grip. The sealant does not contain any solid particles which might find their way into the gas stream and foul the valve operation.

The American Sealants' product converts to a tough seal in the absence of air when confined between metal surfaces. It withstands heat to 300°F.

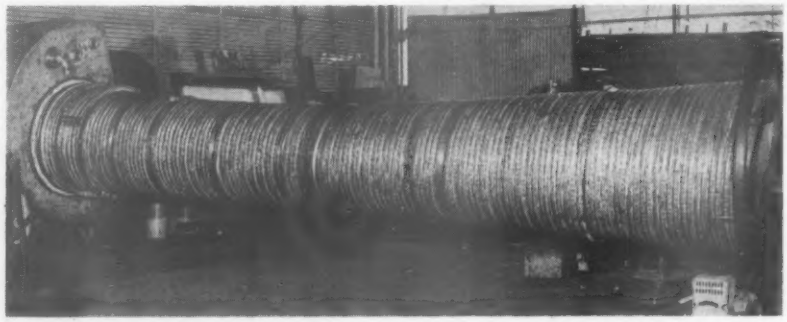
25,000 INERT-GAS SPOT WELDS USED IN TANK FABRICATION

Fabricating a stainless steel tank for an aircraft company required the use of three inert-gas welding processes. National Tank and Mfg. Co., Los Angeles, used tungsten-arc welding and spot welding and consumable-electrode welding to satisfy dimensional and quality specifications.

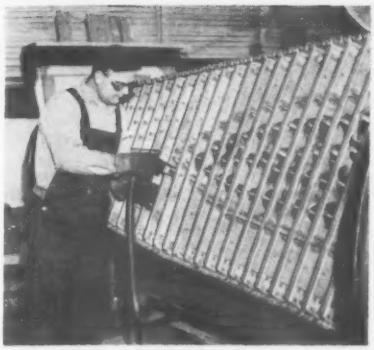
Three feet in diameter and 20 feet long, the ¼" thick tank's butt and fillet joints were made with Sigma welders using type 347 wire. Linde Company's M-2 argon mixture was used as the shielding gas to avoid flux residue.

Longer welds were mechanized by mounting the gun on a carriage for automatic travel.

Some 25,000 spot welds attached 16-gauge channels and corrugations to the shell. (Product design made resistance welding impossible and plug welding impractical.) Heliarc spot welds were made in three seconds each, from one side of the work, with no forging pressure or backup



About 1400 feet of Heliarc welds are required on the outside of the tank sheet alone to form continuous water-tight passages.



Operator uses a spot welding torch to apply clips to the shell. Each weld takes about three seconds.

necessary.

Torches were used to spot weld the channels and to weld the edges together to complete the continuous seam.

ELECTRON BEAM UNITS WELD SUPER ALLOYS

Welders utilizing the concentrated energy of a focused beam of high velocity electrons to weld metals are now in production.

Beamatron, a product of High Vacuum Equipment Corp., Hingham, Mass., will weld high-temperature reactive metals and super alloys ranging from aluminum to zirconium.

The model demonstrated recently will weld tubing or parts up to 3⅛" diameter and in lengths up to 10'. A turntable can be installed for spot welding quantities of small parts.

President J. B. Merrill predicted a bright future for the equipment in applications involving metals which react unfavorably with minute amounts of oxygen, nitrogen or hydrogen. Operation in high vacuum provides the most inert atmosphere now available. Impurities trapped in metal become volatile in machine and the weld is purified, resulting in long weld life.

At the same time the unit cost of such items as nuclear fuel jackets and electronic parts is reduced by the elimination of shielding atmospheres and the reduction of rejects, said Merrill.

A fail-safe operation, a high vacuum is necessary to support an effective electron beam. Any pressure rises above a critical level will break down the beam. •

by **Darrell Ward,** Engineering Editor

Here's how engineers at Duncan Electric . . .

MUFFLE NOISE, BOOST EFFICENCY

"May I have another aspirin," the girl said as she walked into the first aid office. "My head is splitting."

"You've had four already," the nurse observed. "Do you feel you should go home?"

"No, there's nothing really wrong with me. I guess it's just all the noise. It gets on my nerves."

This used to be a problem at the Duncan Electric Co., Inc., of Lafayette, Indiana, with an "aspirin call" every two hours from certain work stations along the assembly line. It used to be a problem, but Methods Engineer Bogdon Mareachen informed us that this problem has been completely eliminated by reducing the noise level in that area.

Noise can produce trouble and it can hide trouble on the assembly line for someone like Duncan, one of the four U. S. manufacturers of watt hour meters. Meter manufacturers must make silent meters. This can be accomplished only in a plant with greatly reduced noise levels, among other facilities which are important to quality production.

Duncan has found that excess noise in the assembly department is a significant fatigue factor for many of the workers. It hinders normal communication; it deadens the "feel" of a tool and inhibits control of torque as well as speed of assembly, and it interferes with inspection, testing and adjusting.

A more curious fact, and one which became more insidious as the plant began to tackle the problems of noise level reduction, is that as one noise is eliminated or reduced, another becomes more noticeable. We have seen this problem before when background music was the resolving element to balance the over-all level of natural noise that cannot be eliminated.

Duncan has not installed background music so far, but has approached the problem from a different angle. They have established the fact that certain noise levels are appropriate for certain departments and each seems relative to some undetermined aesthetic value. In one department, the characteristic noise seems to flow with the work, helps establish a certain work rhythm. In another, a steady-state condition is acceptable, but sharp interruptions with pounding, cracking, screaming or other tool noises will turn the fatigue rate curve almost vertically upward while efficiency and quality take a sharp slant downward.

When we questioned them, some of the assembly workers said that noise didn't particularly bother them. Others took the opposite view. This is natural since it is a well known fact that some people work better when the atmosphere seems to bustle with noise and activity while others must have it quiet. This is not always related to level of intelligence, education, or mental activity vs. mechanical activity. Temperaments vary in all quarters, and it is a wise administrator who can cope with this problem in job evaluation.

However, a very practical aspect of noise level at Duncan, without regard to personalities, was that with too much noise there had to be too much shouting back and forth with misunderstood instructions. In one section of the assembly line where basic electrical movements are put together, two women at opposite ends of a short line work cooperatively to regulate flow of production between their work stations. They must communicate in order to control flow of parts for different types of meters assembled on the same line.

This was a serious case of communication along a line of four or five work stations, each of which employed power screw drivers or power-actuated fixtures. Two noise problems were overcome in order to satisfy the situation. One was general background noise in the area. The other was noise along the line from numerous power-operated tools.

More and more of the new quiet-type power fastening tools are being used, but this does not obsolete older type tools. For instance, one air-operated screwdriver was silenced by installing two C-rings along with gauze padding, wrapped outside with plastic electrician's tape. However, restriction of air exhaust did require re-setting the torque, plus some increase in air pressure.

The two women involved told us quite frankly that the present reduced noise level in their area was an indescribable improvement in the ease with which they could now communicate and efficiently control work flow.

The deadening effect of noise was illustrated at a number of points in assembly. In one place, there is a fixture for driving down a threaded top bearing sleeve into its seat in the frame assembly. The operator began in the morning refreshed and tended to press down too hard on the driver. With high noise level, she could not hear when the clutch ratchet began to chatter. So, she might over-drive and deface the head of the bearing which is an exposed part and must have good appearance. Later, as fatigue set in, the woman's arm began to give out and she would press with less effort, sometimes not bringing the fastener up to proper torque. Again, this was because she didn't hear and know when the ratchet functioned. A reduction in noise level re-

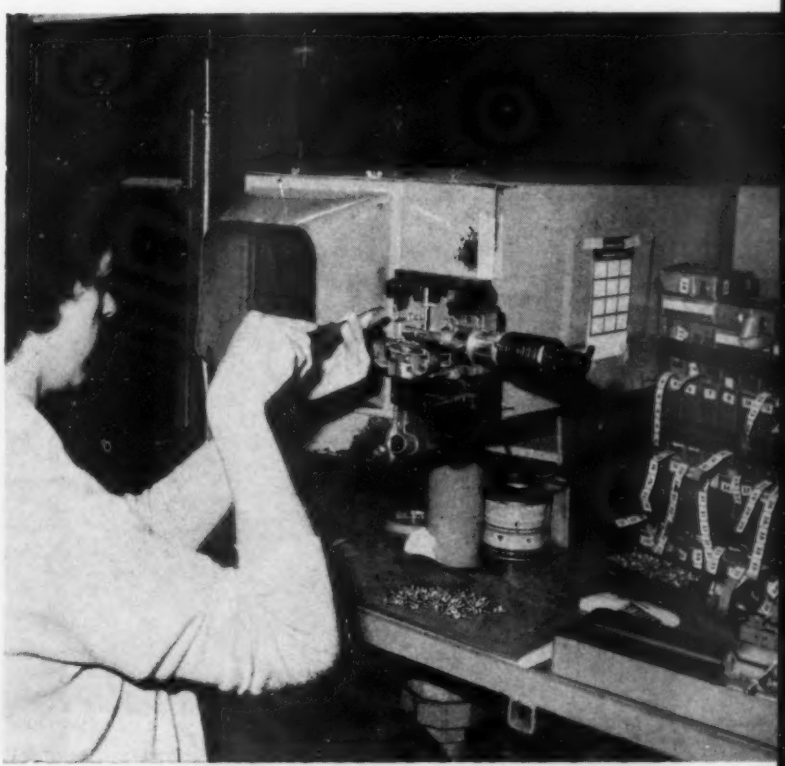
continued

This article presents examples of how a low noise level can better working conditions, eliminate hidden trouble

Name plates for meters are installed with Yankee screwdriver to avoid scarring. Set screws which hold register unit in place are quickly run up with air-driven driver. Both tools are quiet and cause no confusion along assembly line.

Assembly jig with two air-driven screwdrivers, one at top and one at bottom, drive jeweled bearings into threaded seats. Operator had difficulties in this assembly until noise level of area was reduced so she could hear ratchet slip on the reduced-speed Aro drivers.

Worm drive is assembled to frame with screwdriver adjusted to minimum torque. The torque limiter-type clutch makes so little noise that operator could not hear it with high noise level in background. With low noise level, she can apply proper torque.



While worm wheel adjustment is being made on a shadow-graph to a mesh tolerance of .002", girl also listens for any possible noise in bearings which might go undetected with high noise level.

lieved this operator's fatigue and, at the same time, reduced rejects when the sound of the ratchet was not deadened. Two kinds of rejects were eliminated from one source.

In a staking operation, where mounting posts, hanger and disconnect posts are staked to the bakelite base plate in a hydraulic press, an occasional misplacement or omission of small parts would cause unequal pressure and subsequent fracturing of the bakelite, only no one knew when the fracture occurred. It was discovered after noise level was reduced and the operator heard the slight "cracking noise" when the ram came down. Then, she uncovered her occasional error and eliminated all rejects from this source.

Another instance of noise deadening the "feel" or the "sound" of a function was at a checking point where breakdown voltages are tested. Every meter must be constructed so line voltages will be conducted with sufficient air dielectric insulation against breakdown. But, at the same time, spacing of parts must be close enough to make high voltage surges and lightning charges to jump across as in the case of lightning arresters. Each meter must be manually adjusted within a fairly close tolerance spacing of parts. Assembly spacing can vary considerably when these parts are staked or screwed down in position.

The inspector who performs this task uses metering equipment designed to test insulating quality and breakdown at different voltage levels and across different combinations of electrodes. The procedure is an electrical equivalent of a go-no-go gaging principle. The problem is that this function can be performed many times faster when the operator can hear the arcing sound on different breakdown voltage tests on different combinations of connections and, by the quality of the sound, know exactly which electrodes are arcing.

Everyone can recognize the sputtering or sizzling sound of a high voltage arc across electrodes. But, no one normally can distinguish the very slight differences in such sounds when they are affected by the shape of parts or a few thousandths of an inch difference in the gap. That is, no one can make this distinction unless they are as experienced as Duncan's inspector and can work under such low noise level conditions as are now provided in that plant. As things stand, it was easy to demonstrate for our observation the different kinds of arcing sounds, identified with the different components in the meter, because the general noise level on the assembly line was so low.

There were many other situations in which noise level was a major factor in efficiency and quality control at Duncan as illustrated by the accompanying photographs. However, it would be unrealistic not to admit that when Mr. Mareachen became so involved in his discussion of noise and its significance in Duncan's plant, we were a bit skeptical about focusing so much interest on this side light of an assembly line. Yet, once we heard and saw the full significance of noise level problems and what they can mean, there is no denying that noise is a basic problem in any plant. Noise certainly can hide trouble on the assembly line and may be an insidious, unexplored problem in many plants. •

The muffler shown at left eliminates the exhaust air noise from this staking operation. The previous noise disturbed many assembly workers in the area.

In staking parts to bakelite base, pressure will fracture misaligned parts. With low noise level, operator now hears the "cracking" sound. Rejects are less than 1%.

Meters are tested and calibrated in isolated room which is pressurized. Quiet working conditions produce ideal atmosphere for testing, and particularly for detecting anything abnormal.

High potential tester checks arcing across lightning arrester gap. Inspector can hear electrical arc and recognize where adjustment is needed because of low noise level.

Separating heavy traffic from aisles next to work stations was one of major revisions made in plant layout to reduce noise level. No through traffic is permitted in the inside aisle at left to disturb workers.

LET'S CONSIDER APPLICATIONS

The three basic types of solid pins are discussed—straight, tapered and grooved—with emphasis on the latter which combines the best characteristics of other two

by **F. W. Braendel,** President, Groov-Pin Corporation

Before the days of mass production techniques, two types of solid pins were commonly used—the straight pin and the tapered pin. There are still many uses in which either of these will do the job required. But with the rapid growth of production line techniques, there developed a need for a solid pin with grooves along the sides. In this article we will discuss the use of straight, taper and grooved pins, with special emphasis on the latter.

STRAIGHT PINS VS. MILLED KEYWAYS

Straight pins are primarily used for locking gears, sockets, pulleys and levers to shafts where the high torque-carrying capacity of a milled keyway or splined shaft is not needed. They work well in many applications, and are more economical than a milled keyway in locking a part on a shaft against lateral movement.

But they have some shortcomings for production line use. To assure a tight assembly, a straight pin requires a press or interference fit. The pin must be slightly larger than the holes through the two parts. Tolerances must be kept very close. For example, a correct press fit with a ⅛″ diameter pin requires a minimum interference of 0.0004″, and a maximum of 0.0006″. For a ½″ diameter pin, the minimum and maximum interference is 0.0011″ and 0.0020″.

Tolerances this fine require centerless grinding of the pins and reaming of the holes. The parts to be fastened must be drilled and reamed while assembled, or it would be impossible to achieve the necessary hole alignment.

The taper pin does not need the close tolerances of the straight pin. To apply this pin, it is necessary to drill holes in the two parts to be fastened. The holes must be equal to the small diameter of the taper pin. A tool is then required to ream the hole to a taper of ¼″ per foot—the same taper as the standard pin.

If the hole is quite deep, the upper portion of it can be step-drilled with a larger drill to reduce the amount of metal to be removed by the reamer.

When the hole is prepared, the taper pin is inserted and force applied, either by hammering or with a press. The protruding ends of the pin may have to be trimmed if they interfere with the assembly's operation.

Taper pins, properly applied, make an excellent fastening, and may be used in the same types of applications as straight pins.

Their main disadvantage lies in the reaming operation, which, in the case of small diameter pins, becomes a prohibitive cost because of reamer breakage.

Since reaming is necessarily slower and more delicate than drilling, its cost is as great or greater, especially since the parts to be fastened may be drilled separately, but must be reamed while assembled. Otherwise, it is practically impossible to control the depth of taper reaming in the two separate parts close enough to avoid an offset tapered bore. In this case, only one part would be firmly engaged by the pin, and there would be undesirable play between the two parts.

A PARADOX WITH TAPERED PINS

The principle of taper pins creates both an advantage and a disadvantage. Because of the taper, a single hammer blow on the small end of the taper will usually break the lock and allow the pin to drop out. This is helpful on assemblies which have to be taken apart and reassembled frequently. But it is a disadvantage on assemblies subject to impact or severe vibration, since a slight axial displacement of the pin allows it to fall out completely. In this respect, the taper pin differs essentially from the straight pin, which would have to be displaced

OF SOLID PINS

along nearly its whole length before it would drop out.

While both the straight pin and the taper pin are reliable and economical when used under proper conditions, the advent of mass production brought about the need for a pin which combined the ideal characteristics of both—the holding properties of a press fit pin without its close tolerance demands, and the ease of installation of a taper pin without its reaming operation, and with holding ability under shock and vibration.

In other words, the pin surface should not require a ground finish, and the holes in the parts to be fastened should have a tolerance range within the limits of commercial drilling practice. These requirements led to development of the third type of solid pins—grooved pins.

The principle of grooved pins, which gives them a firm holding action together with ease of installation, can be described as follows: Three equidistant, V-shaped grooves are swaged on a pin by means of either stationary or rolling knives, so that the nominal diameter of the pin is enlarged throughout the entire length of the grooved section, through an upsetting, or displacing action.

When this pin is inserted by hammer, air cylinder or press into a drilled hole of corresponding diameter, the grooves are forced to close up. This causes a permanent plastic deformation, and also an elastic deformation, which allows part of the expanded portion to spring back when the pin is removed. The elastic deformation also makes it possible to re-use a pin in the same hole many times without serious loss of holding power.

THE QUESTION OF CLOSE TOLERANCES

The question now arises as to its practical use on the assembly line. Does it require anything like the close tolerances demanded by the straight pin?

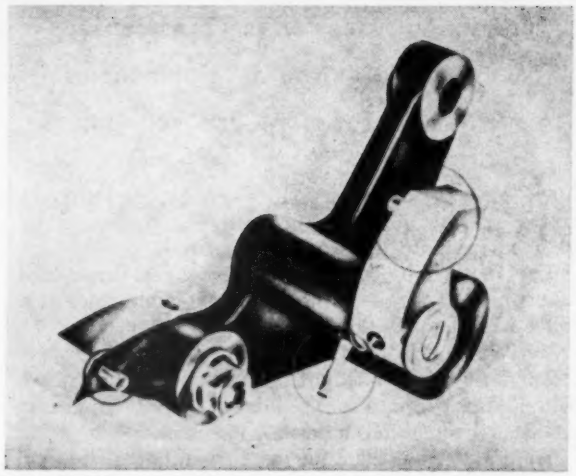
The answer is no, and part of the reason lies in the pins themselves. The maximum increase in diameter occurs right next to the V-shaped groove, and between each two grooves, it tapers down to a minimum increase over the small diameter. This increase in pin diameter varies with the size of the pin—from 0.004″ for a 1/32″ diameter pin to 0.025″ for a ½″ pin.

For ease and consistency of assembly, tolerances on the diameter increase are kept at ±0.002″ on pins with a diameter of ⅛″ or above.

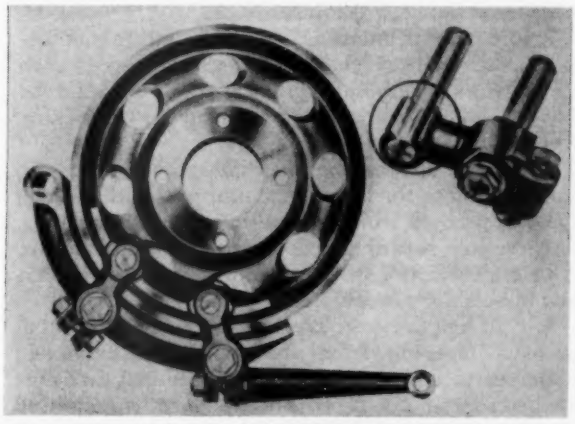
The question now is whether they can be applied to ordinary drilled holes with commercial drill hole tolerances.

The answer is yes for hole tolerances ranging from 0.0015″ for a 1/16″ diameter hole to more than

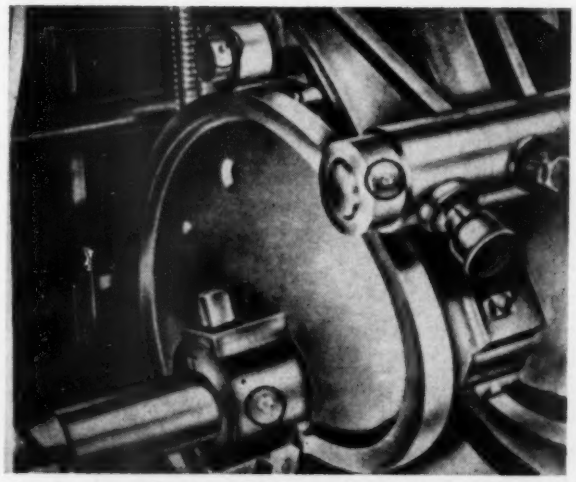
continued



Half-length reverse taper grooved pins are used here as stop pins on a rocker arm and pawl assembly.



A common application of half-length taper or reverse taper grooved pins is as a retainer ring pin on heavy duty truck brakes.



Here is an application of full-length taper pins. They are often used for fastening gears, pulleys and sprockets, and collars and cams to shaft.

The many places where pins can be used has led to the development of seven basic types of grooved pins.

0.006″ for a ½″ diameter drill where tapered grooves are used, but this tolerance may be increased by 50% where parallel grooves are used.

The drill hole tolerance is between three and four times as large as the total allowable tolerance for a straight press-fit pin.

By swaging grooves in the pins, the drilling operation required by straight pins has been eliminated. The reaming operation required by the taper pin has also been eliminated.

Take a ¼″ pin diameter as an example. The drill hole tolerance is a maximum of plus 0.0035″. In other words, the hole may vary from 0.250 to 0.2535″. The expanded diameter of the ¼″ pin may vary 0.004″—or between 0.261 and 0.264″.

The maximum interference, or the difference between the smallest hole and largest pin, would then be 0.014″; the minimum interference would be 0.0075″—more than enough to insure good locking when inserted.

The many applications in which grooved pins are used has led to the development of pins with various types of grooves which suit them for particular uses.

There are seven standard types of grooved pins. A brief description of each, with typical applications and assembly suggestions, follows:

1. Full-length taper: This pin has three full-length grooves tapering from the maximum expanded diameter at one end down to the nominal diameter at the other end. It is probably the most widely used of all grooved pins. It was first developed for applications where conventional press-fit and taper pins had been used.

An important design note is that for the longer length of the larger diameters the expanded diameter decreases as the pin length increases. This keeps the insertion forces of long pins within tolerable limits.

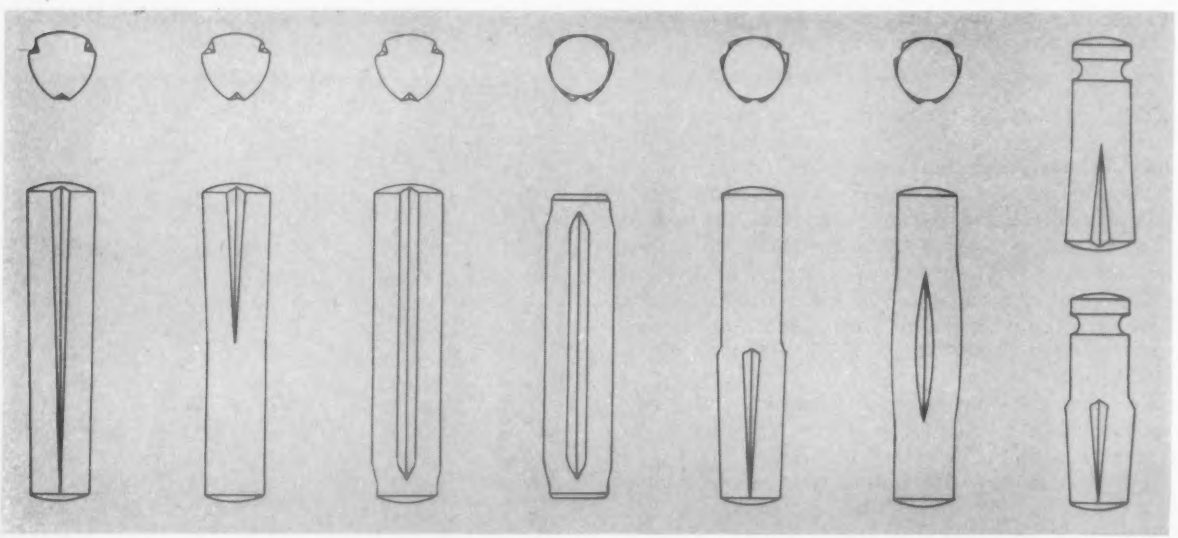
These pins are most frequently used in applications such as fastening gears, pulleys and sprockets, collars and cams to shafts.

2. Half-length taper: This pin is a variation of Type 1, with the three tapered grooves formed over only half the length of the pin. This makes it possible to use Type 2 in place of Type 1 where the holding power is not critical. The ungrooved portion of the pin can be used to line up the holes in the two parts to be fastened before the grooves are engaged. This speeds up assembly and eliminates the need of a drift pin.

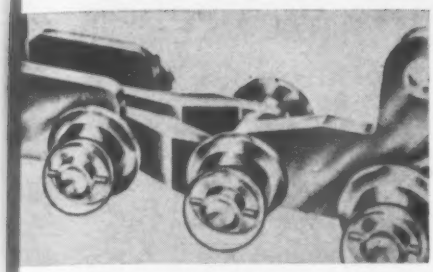
In its most common applications, this type is used as a locating pin, stop pin or hinge pin. When used for the latter purpose, the groove length is generally made to exact length to allow free swivelling of the hinge.

3. Full-length parallel: This type has full-length parallel grooves, except for a short pilot to allow easy starting in a drilled hole. While it has the same field of application as Type 1 pins, it is recommended when unusually high holding power is needed. Here, "holding power" refers to the maximum axial force needed to start movement of the pin out of engagement. Nearly twice the force is necessary to disengage a Type 3 pin as a Type 1 pin. Of course, it also requires nearly twice the force to insert it. For this reason, Type 3 pins are recommended where severe vibration and shock is a factor, and also where a part is to be fastened to a hollow shaft rather than a solid shaft.

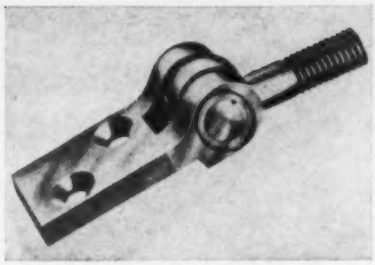
Another important use is on short length pins



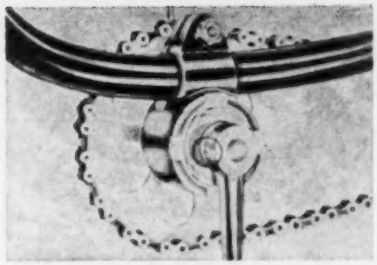
Most applications of grooved pins are covered by these basic types, left to right; 1—full-length taper; 2—half-length taper; 3—full-length parallel; 3H—variation of preceding to permit hopper feeding; 4—half-length reverse taper; 5—center; 6 and 7—half-length taper and reverse taper with annular grooves for spring retention.



Center grooved pins are ideal for use as cotter keys on heavy duty chain links; also ideal for cross handles.



Half-length taper pins are used as locating pins, stop pins, or hinge pins.



Full-length parallel pin is used on tricycle pedals (here), or wherever great holding power is desired.

where Type 3 will assure adequate holding power despite the short length of pin engagement. Conversely, it is often better to use a Type 1 pin where very long pins are needed, as the great force required to insert a Type 3 pin could exceed the compressive strength of the pin material and result in buckling the pin end.

Another factor in the use of Type 3 pins concerns their use with material considerably harder than the pin material. It is best to chamfer the entering end of the hole so that the expanded section of the pin cannot be sheared off, thereby reducing its holding power. In this operation the ideal included angle of the counter-sinking tool should be 30 degrees, with 45 degrees an absolute maximum.

Applications of Type 3 include attaching tricycle pedal arms to coaster and brake shaft, attaching sprocket and gear to photographic equipment shaft, and such automotive uses as fastening clutch and brake pedals to cross-shafts.

A variable of Type 3 has a starting pilot on each end to make the pin suitable for hopper feeding.

4. Half-length reverse taper: This pin has the half-length grooves similar to Type 2 pins, but the taper on the grooves is reversed. This means that the grooved end is inserted first, and usually in blind holes, while the Type 2 pin is inserted with the un-grooved end first, and usually in through holes.

The field of application for the Type 4 pin is similar to that of Type 2, but more limited. The most common usage is as a stop pin and locating or dowel pin.

Additional points of interest to design engineers is that the grooves on these pins can be swaged in other than standard length if the use requires it. Special needs can also be met, such as parallel instead of tapered or oval grooves.

5. Center: In its standard form, this is one of the most widely used types of grooved pins. It has three oval grooves of a length of half the pin, but located centrally on the pin.

Although developed during World War II principally for aircraft cowling, this type has been applied to many other types of products—such as buses, trucks, industrial washing machines, and other equipment where quick removal and installation of cover plates and inspection hole covers are required.

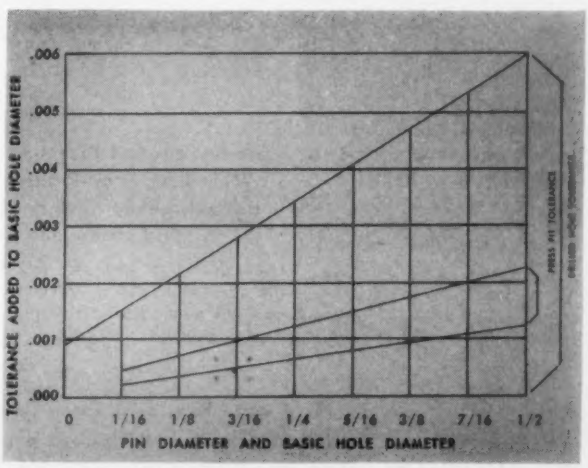
6 and 7. Half-length taper and reverse taper with annular grooves: These last two types of standard grooved pins are similar to Types 2 and 4, except for annular grooves on the un-grooved ends to allow the pins to be used as spring anchor pins. These annular grooves may be machined to permit the use of retainer rings.

Type 6 pin is used in through holes, with the annular ring end inserted first, while Type 7 is used in blind holes, with the grooved end inserted first.

Standard grooved pins are normally supplied as stock items in cold drawn, low carbon steel, but are also available in alloy steels, stainless steels, and non-ferrous metals. High shear requirements are satisfied by heat-treated alloy steels where the design limitations prevent the use of larger pin diameters.

For applications subject to repeated stress reversal, the use of soft pins or alloy steel pins, tempered to a medium hardness range, is recommended to minimize the possibility of fatigue failure during the life of the equipment.

There is one other type of grooved pin which is worthy of mention here. This type has three parallel grooves at one end, running ¼ the length of the pin. It has a pilot at the grooved end which permits inserting the pin in either blind or through holes. These pins are designed primarily for pivot, linkage and hinge applications. ●

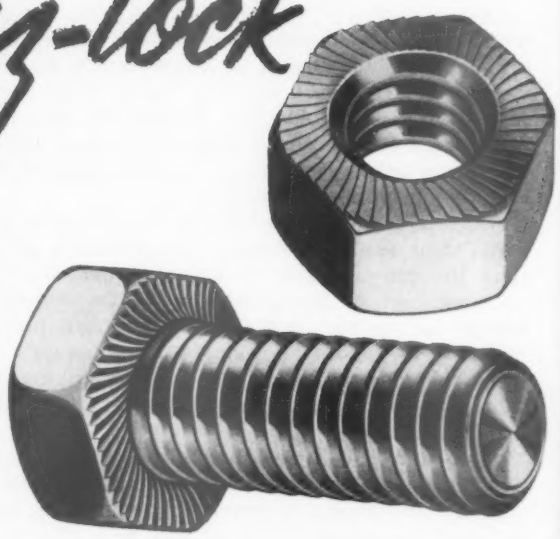


Drill hole tolerances are three to four times as large for grooved pins as for straight press-fit pins.

Fascinating Fastener...

An exciting new and secret project dubbed "operation buzz nut" by plant and office employes is now revealed as a unique and fascinating idea in fasteners—MacLean-Fogg's new *Whiz-Lock.*

the MF whiz-lock



STARTLING RESULTS

Out of M-F research and development labs has come a lock nut that has amazed even those who first conceived it. A free-spinning surface-bearing lock and tension nut which surpassed expectations even in the earlier models.

The Whiz-Lock principle (an entirely new concept in fastening) has been a well-kept secret for over a year. Now patent applications are in—and this startling device is ready for designers, engineers and production men to uncover new properties and uses for this amazing fastener.

LOW COST, TOO

Whiz-Lock was released only when its design was capable of precision manufacture on conventional machinery. Thus Whiz-Lock is NOT a premium-priced nut!

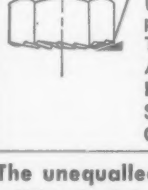
Try this amazing Whiz-Lock test for yourself!

Apply a common nut with as much torque as you can. Torque to release it doesn't even reach application torque.

Now spin on a Whiz-Lock, tighten—and try to break it loose! (Caution: do not attempt on glass-top or light-weight desks.)

THE CURVE of the TEETH

UNIFORM TORQUE-TENSION *HIGHEST* "BREAK-LOOSE" TORQUE



THE ANGLE of the BASE

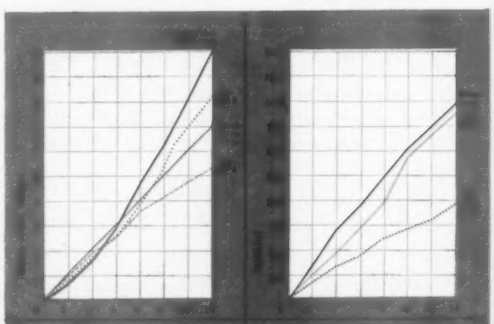
EFFICIENT on ANY SURFACE (even depressed side of punched holes) *INITIAL* CONTACT and LOCK IMMEDIATELY NEXT TO SCREW or BOLT HOLE *ALL* LOCKING STRENGTH WITHIN NUT CIRCUMFERENCE

. The unequalled locking ability of the Whiz-Lock is only one of its many advantages to designers, engineers and production men.

• One piece • Free spinning • Very high tension • High strength—heat treated • High re-useability • Consistent—uniform torque tension • Highest release torque to application torque • Low cost

ON-and-OFF-TORQUE RATIO CHART

TORQUE-TENSION CHART



NOTE the excellent torque-tension and "apply and release" ratio of the M-F Whiz-Lock in *both* tests.

For oversize holes or wherever flange use is indicated, the same WHIZ-LOCK principle is available in flange nuts and screws.

SEND FOR BROCHURE... information on sizes and dimensions... M-F Whiz-Lock Nuts and Screws and M-F Flange Nuts and Screws

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Equipment and Techniques for the . . .

APPLICATION OF WELD FASTENERS

by **Ray H. Smith,** Associate Editor

So you have the proper parts and welding equipment. What next? Here's a guide to setting-up, controlling the weld and avoiding some common mistakes.

THE effective application of resistance welded fasteners requires more than just an understanding of fastener design. Since the part's performance will be only as lasting as the weld which affixes it, three basic welding adjustments must be mastered. They are the control of heat, time and pressure.

The heat, or current, is adjusted by a regulator which changes the ratio of primary voltage to secondary voltage. (The amount of heat generated in the welding projection increases with the square of the current expressed in amperes.) Most parts require from 5000 to 25,000 secondary amperes to produce enough heat to make the weld. In most cases the machine will have the maximum secondary current rating of the welder on a name plate.

It is important to set the heat regulator at a point where voltage will not cause flashing or sparking when the weld is made. Too much voltage along with the high current values will cause the projections to "explode," resulting in a poor weld. Secondary voltage will range from 2 to 4 on small fastener sizes, 5 to 8 on larger sizes, and 9 to 12 for ring-type projections.

Pressure is applied by pneumatic or hydraulic cylinders. The pressure is used to assure good electrical contact of the projections with the sheet and to "forge" the projections into the sheet after the metal reaches fusion temperature. Mild steel offers a wide permissible pressure range. Consequently, pressure adjustment is the most constant of the three major adjustments. Most parts require 800 to 1200 lbs. pressure at the electrodes. Those with ring-type projections may take up to 2500 lbs.

Insufficient welding pressure will cause excessive

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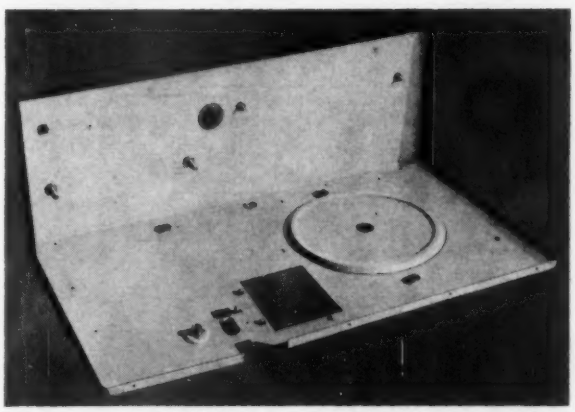
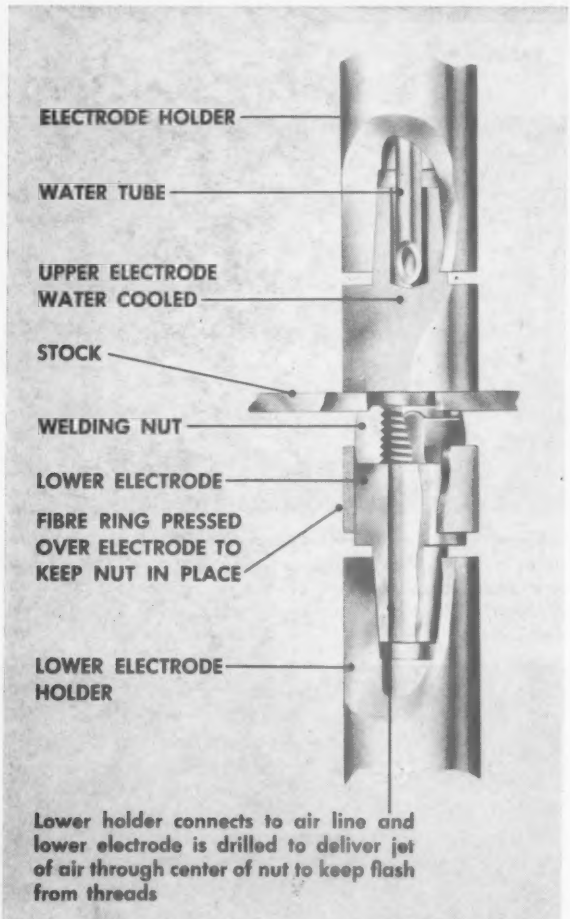


Inside-mounted weld nuts and pins (above) preserve the clean outside lines of the Emerson air conditioner. On one such setup (below) at the Kusic-Haines plant in Weirton, W. Va., four nuts are projection welded simultaneously.

1. Force gages provide a quick and accurate method of checking welding pressure at the electrodes.



2. Cutaway view of a proper welding setup shows a piloted projection nut located in drilled hole.

3. Ball socket electrodes assure parallel relationship between electrode faces.

Weld Fastener Application, continued

discoloration and flashing. A force gage (Figure 1) can be used to check the pressure at the electrodes or the approximate pressure can be calculated by multiplying the line pressure in lbs. psi by the area of the cylinder in square inches. A 10% loss should be figured for the friction in the head.

Time is designated by cycles, one cycle representing 1/60th of a second. The average weld will take from 2 to 15 cycles depending on metal thickness, size of fastener and capacity of welder. Weld times should be as short as possible, and the weld should be made in one hit. Pulsation welding should not be attempted with fasteners.

When appearance is especially important, a "hold time" of 20 to 30 cycles is often helpful in retarding weld discoloration. Hold time is the time the electrodes are held against the work after the current has been stopped, giving the weld area a chance to cool slightly before the electrodes open. This reduces oxidation.

WELDING STAINLESS STEEL PARTS

Welding stainless steel fasteners requires special attention. Parts made from Austenitic 18-8 type 305 to weldable grades of stainless will require considerably higher welding pressures, cleaner assemblies and both less current and weld time to avoid discoloration, burning and carbide precipitation.

On most stainless parts, a range of 5 to 10 cycles on the popular gauge thicknesses under .125" is recommended. Discoloration can be held to a minimum by using a hold time of between 30 to 50 cycles. RWMA copper-base Group A, Class 3 alloy electrodes should be used.

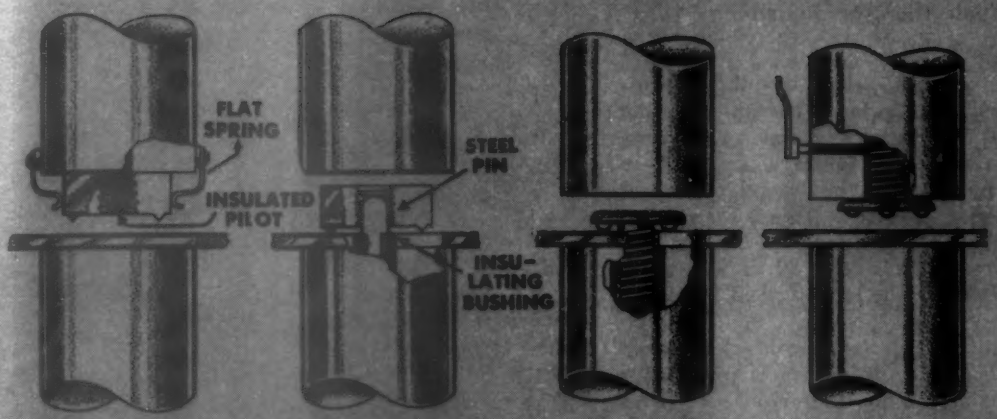
The most expensive welding machine couldn't produce a quality weld using the wrong type of electrode, or the right electrode the wrong way.

Projection welding electrodes should be located directly on the center line of pressure applications to minimize machine wear. Opposing electrode faces should always be parallel. Accurate alignment will mean uniform welds (Figure 2). A simple check can be made by placing a piece of carbon paper between the electrodes under pressure, with the current off, of course.

Sometimes when it is difficult to maintain parallel relationships between electrode faces, due to age or condition of the welder, a ball socket electrode may be used (Figure 3). This swivel type electrode will correct misalignment to a great extent.

The electrode face should always be larger than the base diameter of the projection.

Flat-faced electrodes with sides beveled to 30° angle are standard. Most applications require only a RWMA Class 2 copper-base alloy electrode. However, for increased life in high-production welding, copper-tungsten alloy, RWMA Class 12 (Elkonite), approximately ¼" thick may be brazed to copper-base electrodes. This facing material should have a minimum hardness of 90 Rockwell "B" and an electrical conductivity of not less than 30% of that of copper.



4. Insulation is essential whenever parts pass through metal. The steel pin is spring mounted for retraction when upper electrode contacts the nut.

To maintain weld quality and appearance, electrodes can be periodically dressed or faced off in a lathe.

Use tips with internal water cooling coming to within ½" of the welding face.

Jigs and fixtures are often necessary to hold and locate work when welding sheet metal. All these clamps, pins and moving devices for locating work should be insulated to protect against electrical shorts caused by flashing. Also, conductors should be kept out of the "loop" as much as possible.

Whenever a screw, pin or nut passes through a hole in sheet metal, the locating electrode must be insulated (Figure 4). Experience at Ohio Nut & Bolt has revealed that when subjected to constant thread contact, a combination of asbestos-based Micarta within a stainless steel sleeve wears five times as long before requiring refacing as other common insulators.

Poor electrode insulation can cause poor welds, resulting in fastener failure. This happens when current shunts through the fastener body without completely melting and fusing the projections. Further insurance towards preventing shunting can be had by making the hole in the sheet metal a full .010" larger in diameter than the body diameter of the fastener on smaller sizes, and .030" on larger parts.

ELIMINATING METAL SPATTER

Among the problems to be avoided in the welding of fasteners, flashing is the most common. This spatter of molten metal is the result of poor welding. Its chief danger comes when metal particles are thrown on threads, where they cling and hamper the assembly of mating parts. Too high voltage or too low weld pressure will cause flash. In one instance, current is being pushed through the projections too fast, causing the projections to burst. In the other case, the contact between projections and the engagement sheet is not great enough to provide good electrical contact for the flow of current; therefore, the current tends to arc or flutter, causing flash.

Improper weld timing will also lead to flash. When the welding current goes on before the upper electrode makes contact with the part. This is solved by increasing the squeeze time.

A buildup of plating on parts is a not-too-frequent problem. Threads are capable of taking only a maximum of .0002" plating before affecting assembly effectiveness, whereas stampings can be plated up to .001" before causing welding problems. Most manufacturers compensate for plating by making threads slightly undersized.

While spray-painting of parts already welded in place does not pose serious problems, dip painting of assemblies might clog up nuts and force retapping.

Projection welding holds its biggest rewards for multiple-fastening setups (Figure 5). Where a press-type welder of sufficient capacity is available and production is large, this method is urged.

Fixtures for handling parts should be simple and fast since 75% of the welding operation is consumed in placing and removing the work. Hopper feed units, either installed on standard machines or designed as part of special assembly machines, are

continued

5. The Certified Welding Co., Cleveland, turns out 360 cups an hour, attaching weld screws in multiples of three with a special electrode setup.

desirable (Figure 6).

Where multiple welding is done it will be necessary to make adjustments in force, current and time controls. Ohio Nut & Bolt tests on screws and nuts indicate an approximate minimum of from 15 to 20% progressive increase for the second, third and fourth parts welded in one setup. This is for smaller sizes of fasteners. With medium sized parts, the gradual increase required is from 30 to 50% more than for one part and for the largest sized fasteners, from 50 to 75%.

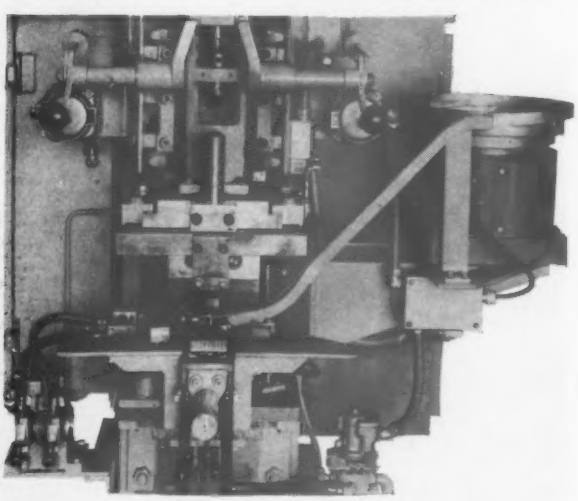
The rule of uniform electrode contact on each projection, as well as the uniformity of projections and parts, remains applicable. Individual electrodes should be inserted in a copper block to enable each electrode to be removed for refacing or replacing.

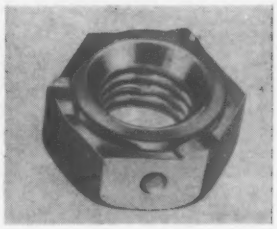
Spot weld nuts and screws can be attached with the same equipment and in the same setup used in spot welding sheet metal assemblies. This type of fastener has a long flange which offers easy electrode positioning while taking the welding area away from the threads. A primary fastener, it is also useful in bridging two pieces of metal, reinforcing, as a wing nut, in conjunction with rubber and plastic molding. It is recommended for sheet metal .030″ to .093″ thick.

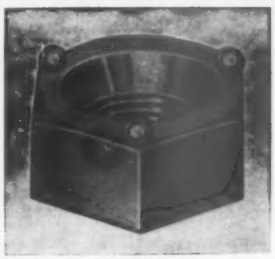
One of the features of the spot weld nut, as well as some projection parts, is the pilot. Chief engineer Harry Kaiser of Jackson Auto Radiator points out that the raised pilot not only eliminates the need for jigs and fixtures, but also permits deeper thread engagement.

In spot welding, the same general principles apply as in projection welding. Smaller electrode tip diameters wear out much faster than projection electrodes. Tip diameters must be changed for each thickness of metal to be welded. For instance, if a ¼-20 nut is welded to a sheet .040″ thick, the tip diameter on the sheet side should be approximately .178″; if the nut is ⅛″ thick, a tip diameter of .305″ will be required.

6. This hopper-fed press-type welder is tooled to hot-upset a stud to channels for automobile door windows.







7-8-13. Weld nut (above left) is both piloted and locking. Screw head (above right) contains metal overflow within rim for a flush fit. Countersunk weld nut (right) protects threads from "flash" and from need for retapping.

Often it is possible to eliminate much of the indentation left on one side of the weld by increasing the tip diameter on the side which normally receives minimum indentation and discoloration.

When welding different thicknesses of material, such as 3/64″ and 3/16″, it may be necessary to make adjustments to obtain heat balance. Heat balance may be corrected by varying the tip diameters or by using welding tips of different electrical conductivity.

There are other weld fasteners designed to meet special needs (Figures 7, 8, 9, 13). Water-tight nuts are made with a blind thread hole and ring projection to insure a hermetic seal. These nuts are widely used in the air conditioning, refrigeration and transformer industries. For this rugged fastener, up to a 250 kva rating may be required. Press-type welders should have a rigid head and the lower horn socket should be strengthened by a knee to prevent distortion during welding.

Pads are used to mount a device at a given distance from the face of the sheet metal. These mounting pads give the maximum possible bearing surface.

Spade weld bolts are used to fasten a cover to a box or to fasten a strap holding a pipe in position.

Impressive economies are possible in the tubular steel field where attaching to curved surfaces is necessary. While each application must be studied separately, projection welding of parts can often eliminate drilling, tapping and inserting of threaded studs (Figure 10). Necessary part design information would include thickness and type of material and radii or contour of surfaces.

Screw machine parts can also be projection welded, usually in "one-shot" special applications.

Because weld fastener manufacturers seldom make two mating parts, threads must be common to industry. The American Standards Association recommends coarse threads, but some fastener sizes are available in fine threads.

Screw threads are generally Class 2A in sizes 10-24 and smaller and Class UN 2A Unified Series in sizes ¼-20 and larger. Nut threads are Class 2B, American Standard in sizes 10-24 and smaller. They

are Class UN 2B, Unified Series in sizes ¼-20 and larger.

Alternative uses are constantly appearing for weld parts. Central Sheet Metal, on one part alone, is cutting costs $2000 a year by using a standard ¼-1½ weld pin as the drive shaft on a Premier automatic letter opener (Figure 11). Original specs called for special machine screw part.

Fasteners are also commonly used as inserts in molded articles, spacers, lock nuts, channel nuts, adjusting screws, and on and on.

How dependable is the weld fastened joint? While strength will depend on thickness of the metal, in normal usage the weld will be stronger in shear, tension or torsion than the body diameter of the fastener itself. Normal thickness is regarded as from about .030″ to .125″ with use of screws ¼-20 to ⅜″. When using screws in diameter sizes 6, 8 and 10, the drop must be down correspondingly thinner metals to get equal or greater strength from the weld.

There is still much work to be done in the area of quality control of projection welding. Projection welds are widely tested by either a visual inspection or an impact test. Neither method is a positive way for evaluating quality.

Since established standards are few, individual judgment is important in visual inspection. Some of the indications of weld quality are symmetry of weld spots, degree of heat discoloration, space between welded surfaces or excessive "dimpling" of unmelted projections.

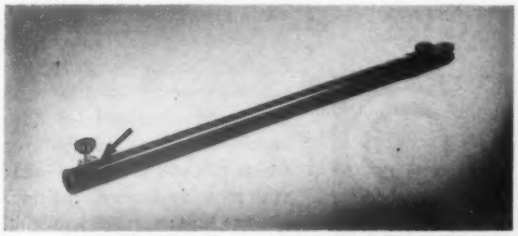
When a good weld has been obtained, regardless of application, the projections should pull metal from the sheet (Figure 12). An impact test, properly calibrated, detects defective welds, but over a period of time many borderline welds may be accepted.

General Motors, which makes much of its own automobile hardware, devised a method of testing the projection brackets used in inaccessible door and body panels. This became vital as soon as engineers found that the cost of replacing defective parts either in final assembly or in the field was exorbitant.

It was decided at GM to use flat test specimens and a tensile testing machine. A destructive test was made on two parts once each hour over a six-day period. The data obtained was recorded on average and range charts. Analysis determined that weld strength was dependent not only upon welding factors like machine-control settings and electrode condition, but also upon projection height and zinc-plate thickness. Thereafter, these factors were closely checked against production specifications. •

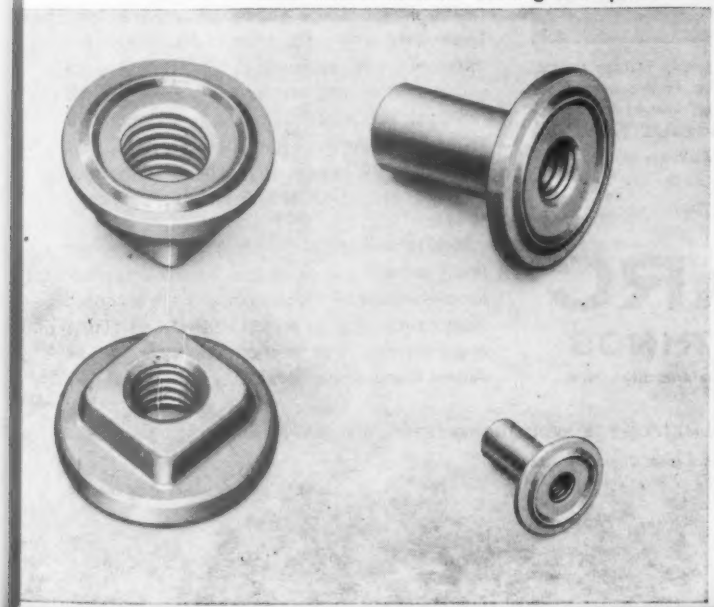
Acknowledgments

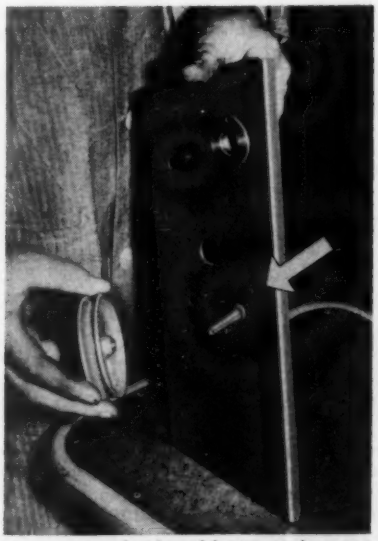
Special thanks go to the following manufacturers of welding fasteners, resistance welders and electrodes for assistance in preparing this article: The Federal Machine & Welder Co.; Grip Nut Co.; MacLean-Fogg Lock Nut Co.; Midland-Ross Corp.; The Ohio Nut & Bolt Co.; Parker-Kalon Div., General American Transportation Co.; P. R. Mallory & Co., Inc.; Sciaky Bros., Inc.; The Raytheon Mfg. Co.



10. Drilling and tapping this tubular table leg was eliminated by using a projection weld nut.

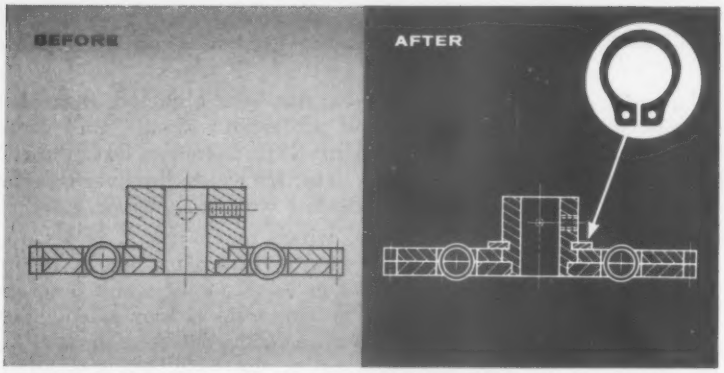
9. Rugged ring-type weld nuts are widely used where hermetic sealing is required.



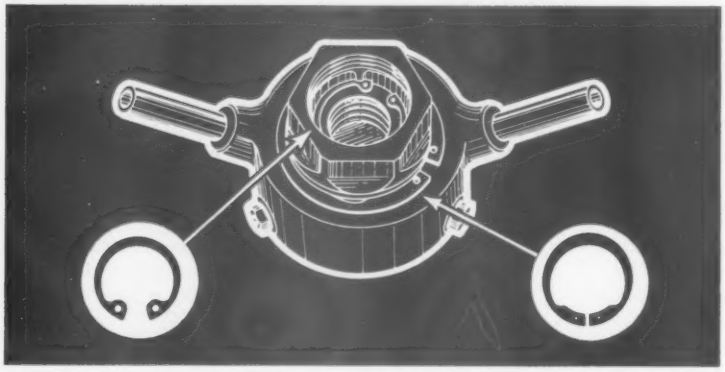


11. A standard weld pin replaces a machined special as a drive shaft.

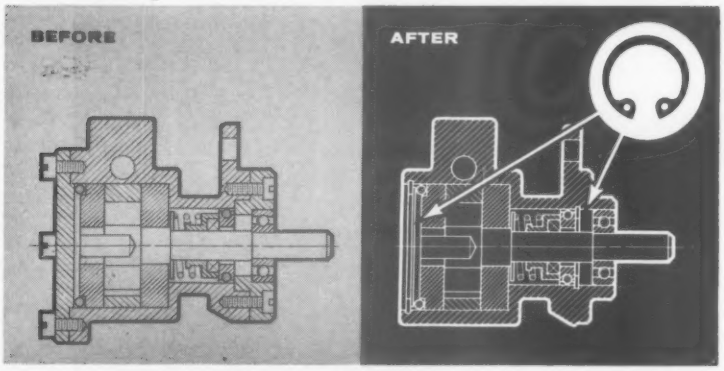
12. Properly welded projections will pull parent metal before giving way.



Gear assembly improved. A Waldes Truarc Series 5100 retaining ring in this anti-backlash gear assembly eliminates machining and staking operations, reduces hub size, and allows easy disassembly, after gears are cut as a unit, for faster, better deburring. **Typical savings: $350.00 per 1000 units.**



Threaded retainers eliminated. In this self-sealing coupling, costly internal and external threaded retainers were eliminated by easy-to-apply internal (Series 5000) and external (Series 5108) Truarc retaining rings. **Savings per unit amounted to $4.02.**



End-cover design simplified. In this general-purpose pump, two Waldes Truarc, Series 5000, internal retaining rings make possible the elimination of two cover-plate castings (plus machining) and eight screws (plus drilling and tapping). Weight and dimensions are reduced and assembly and disassembly are greatly facilitated. **Typical cost savings: $1.48 per unit.**

Designing for axial assembly with Truarc retaining rings

eliminates parts, machining, speeds assembly, simplifies maintenance

The proper application of retaining rings on or in axial assemblies can often effect startling simplifications and economies in design when compared to corresponding designs with conventional fastening devices. A few typical examples, using basic types of retaining rings, are shown in the accompanying drawings.

Threading, tapping, drilling, facing and other costly, time-consuming operations can be eliminated. Retaining rings are already in wide use in a tremendous variety of equipment ranging from household products to high-precision military gear designed for use under the most severe environmental conditions. They are quickly and simply installed in easily cut grooves which can often be machined simultaneously with other operations. The rings can frequently replace bulkier, more costly fastening devices —such as nuts, screws, studs, threaded sleeves and retainers, cotter pins, set collars, rivets and machined shoulders.

What's more, rings frequently make practical designs which could be achieved with no other known fastening device.

Although the ring types shown here are basic, Truarc retaining rings come in 50 functionally different types, as many as 97 different sizes within a type, 6 metal specifications and 13 finishes. You'll find detailed descriptions of Truarc retaining rings and assembly tools, plus more than 70 typical applications in the new 24-page catalogue RR10-58. Write for your copy today.

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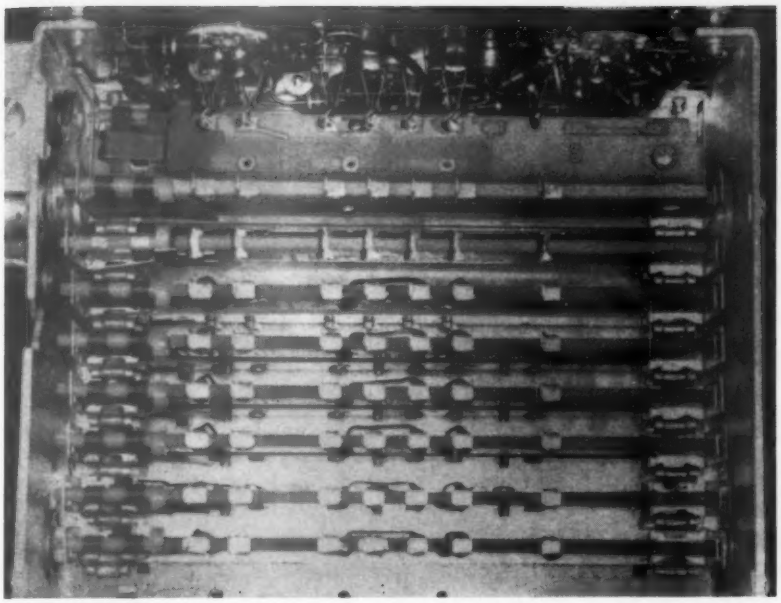
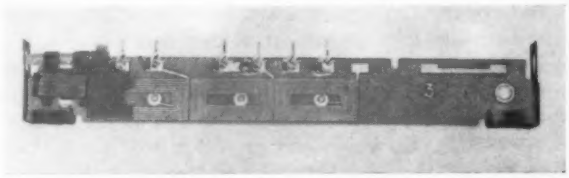
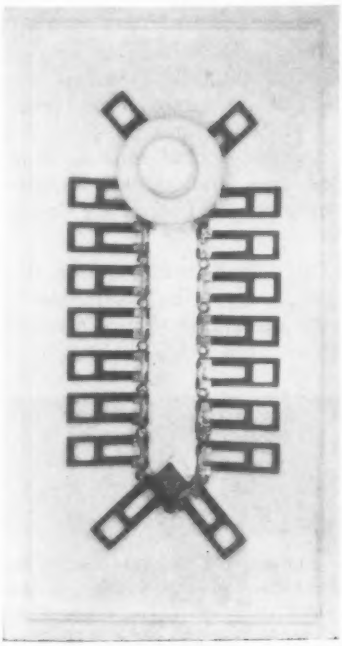


Spring steel clips serve multi-purpose in Liberty's all-channel television step-tuner

A look inside new all-channel step-tuner shows orderliness due in part to use of multi-purpose fasteners.

FASTENERS SERVE AS TV COMPONENTS





Above is shown the complete channel board with the contact, fine tuning and link clips in position.

At left is mock-up of the clip linkage showing how 18 of these fasteners form an endless chain. There are two such chains per tuner.

The Liberty Manufacturing Company, of Youngstown, Ohio, has developed a new all-channel step-tuner for commercial television channel selection.

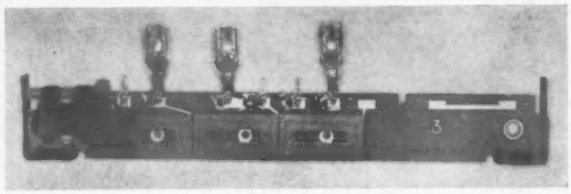
Vitally important to the successful development of Liberty's new product was a practical solution to the problems of mass assembly. Working closely with Tinnerman's development team, Liberty's design staff found the answers in the application of specially-designed multi-purpose spring steel fasteners.

By combining the functions of several loose pieces into a single stamping, it was possible to reduce small parts handling to an absolute minimum and to eliminate several assembly operations that would otherwise have been necessary. The fasteners became important links in the chain assembly and serve as more than just fasteners. They are actual components.

The eighteen VHF and UHF strip boards used are actually individual printed circuits which must be rotated into tuned position. To accomplish this, special spring clip links were developed which engage each end of the strip boards ,and then interlock with the clips on the next board, and so on, until an 18-board link chain has been formed.

The spring clips look themselves on the boards firmly under live spring tension and will not loosen or shake off. They interlock to form the chain without benefit of hinge pins, crimping, etc. It is simply a matter of slipping interlocking spring fingers together where they hold reliably under tension. The

continued



This illustrates how the wiper contact clips on each channel board sweep into contact with the female contacts which are self-retained in the top plate. In this illustration, they have been removed for clarity.

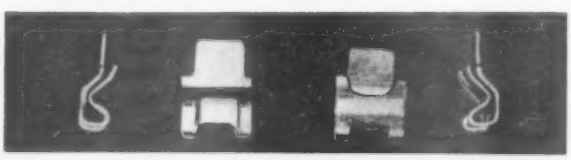
boards ascend and descend in a vertical path as the tuning knob is turned, but are held in a horizontal plane by the clips. As they reach the top they swing into tuned position by making a 90 degree turn to vertical where wiper contacts engage the top mounted chassis board.

The male wiper contacts on each strip board are actually self-retained spring clips which button-hook into locked position on the notched board. The female top contacts on the chassis board are also self-retained clips which are pressed into the mounting hole and then expanded into locked position from the top side. In each instance, a minimum of time and effort is required to complete the installation.

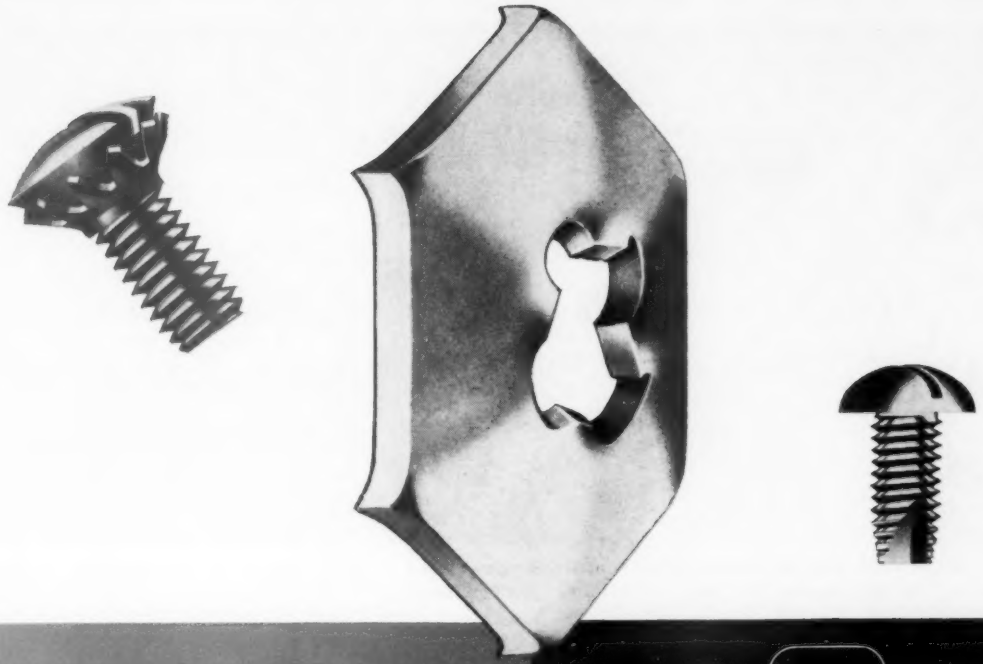
Another example of the versatility of spring steel fasteners in simplifying assembly operations is the fine-turning mechanism provided on each strip board. This, too, comprises a self-retained clip which locks solidly on the strip board by snapping firm retaining legs into the mounting holes with a rolling motion. The clip holds and provides bearing for the fine tuning cam. This cam is a molded nylon part that lifts the contact surface of the clip away from the printed circuit field on the strip board for fine tuning adjustment.

Just as these clips simplify assembly, so also do they simplify servicing in the field. By loosening four screws, the top plate can be removed and each channel board can be switched into position and serviced. Held firmly under spring tension, they can be easily snapped free and removed. Once servicing has been completed, the boards are simply snapped back into place.

Liberty's all-channel step-tuner is a good example of how laboratory precision can be attainable in mass production through the application of creative fastener engineering. •

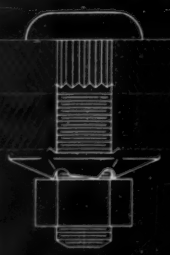


These brass alloy wiper contacts are self-retained in the strip board where they hold themselves in position. Solder is used to assure good electrical contact. There are seven of these clips per each channel board.



HOW TO SELECT
COST-SAVING

fasteners for heavy duty applications



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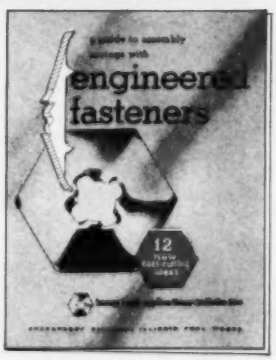

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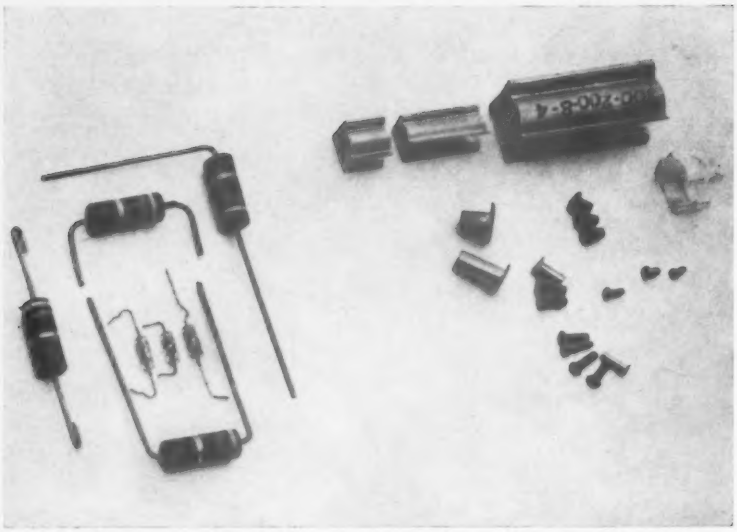


These electronic components and hardware are automatically assembled onto printed wiring boards forming the vital sub-systems of computers.

Use of automated and semi-automated equipment with constant on-line inspection speeds production of wiring board for digital computers

SEMI-AUTOMATED ASSEMBLY OF

Component leads are fed into this machine where they are automatically sorted and aligned, cut to size, then shaped to the required pattern for hand assembly.

To meet an increasing demand for their digital computers and other electronic products, Librascope, Inc., of Glendale, California, has developed some new fabrication and assembly methods. Librascope engineers say that these techniques permit production rates formerly thought unobtainable in computer manufacture.

The automated circuit board assembly facility at Librascope currently occupies about 6000 square feet and employs 50 skilled technicians, equipment operators, inspectors and assemblers. The circuit boards are received from the plant's printed wiring process section. Holes are drilled for connections; components inserted and soldered. Rigid inspection take place at every stage of assembly to insure the highest reliability.

Engineering drawings are supplied to the assemblers for location of holes and placement of eyelets, rivets or temporary terminals. Eyelets are placed for insertion of a wire or a component lead, and rivets are set to hold brackets or larger components.

Automated machines insert the eyelets, which range in size from .048 inch to 1/8 inch diameter. Solder eyelets are used for unassembled boards, usually requested by the military for use as spare parts. Components are mounted and manually soldered into place in the field.

The five machines used in the department install as many as 60,000 copper eyelets each shift. The department also has semi-automatic riveting machines.

Components are inserted in the boards by Dynasert machines. One operator tends and loads three

Special machines insert various sizes of eyelets which serve as receptacles for the electronic component's leads.

CIRCUITRY BOARD

machines. The components are aligned automatically by the machine, the wire leads are clipped to length, bent to fit into the holes properly, then crimped into place. The crimped lead holds the component firmly until dip soldering connects it to the printed circuit.

The components are miniature precision resistors and diodes from .400 to .800 inches across. Each machine is fitted with a company-designed magnetic stop that precisely registers the boards the operators insert in the machine.

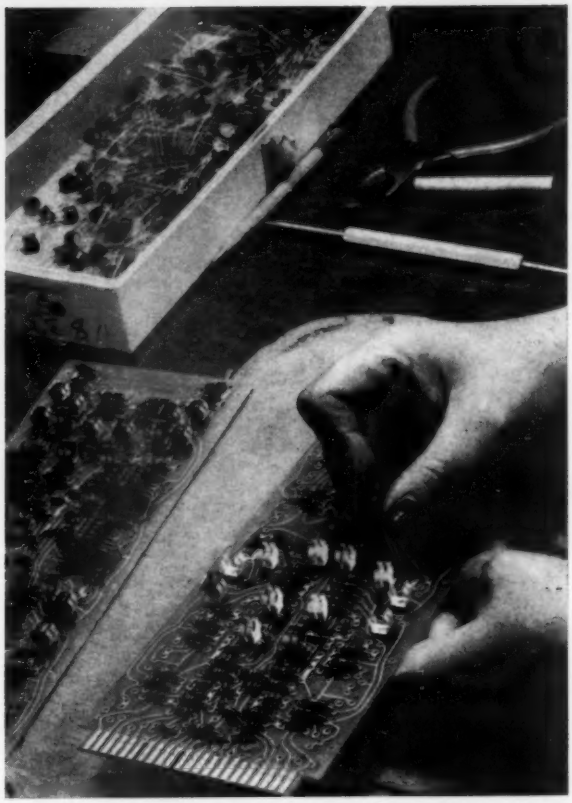
For larger boards, company engineers developed a cycling feed that automatically positions the board for multiple insertion of diodes. Librascope is modifying all of its component-insertion machines to accept the new ratchet feed.

A high degree of automation has been developed even for manual assembly sequences. Where manual insertion of components is required, special machines are used to "perform" the component leads. Parts are fed into the machine by a hopper, where they are automatically sorted and aligned, the leads cut to size, and shaped to the required pattern.

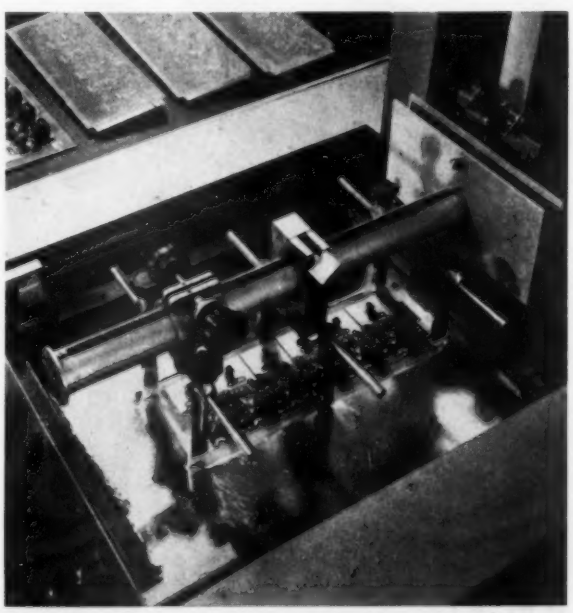
After assembly, each board receives a complete inspection before cleaning. Boards which pass the rigid inspection standards are given a pre-wash in hot detergent solution to remove all contamination and grease. They are then brushed and air dried.

The next step in the sequence is to solder the components into place. Each board is carefully coated with a maskant to prevent the solder from adhering to parts that do not require it. Such parts as metallic component cases, terminal connections, etc., are

continued



Special components such as transformers, transistors, capacitors and relays are assembled to boards by hand because of their size, shape and general configuration. These operations are normally performed after other automatic assembly operations are done, but prior to dip soldering.



Final step in the assembly sequence is to solder the components in place. Here, at dip soldering station, the boards are gripped by a series of fluoroplastic fingers and dipped for a four-second cycle. A maskant is used to prevent solder from adhering to parts not requiring it.

Computer Circuit Board Assembly, continued

coated with the removable masking material.

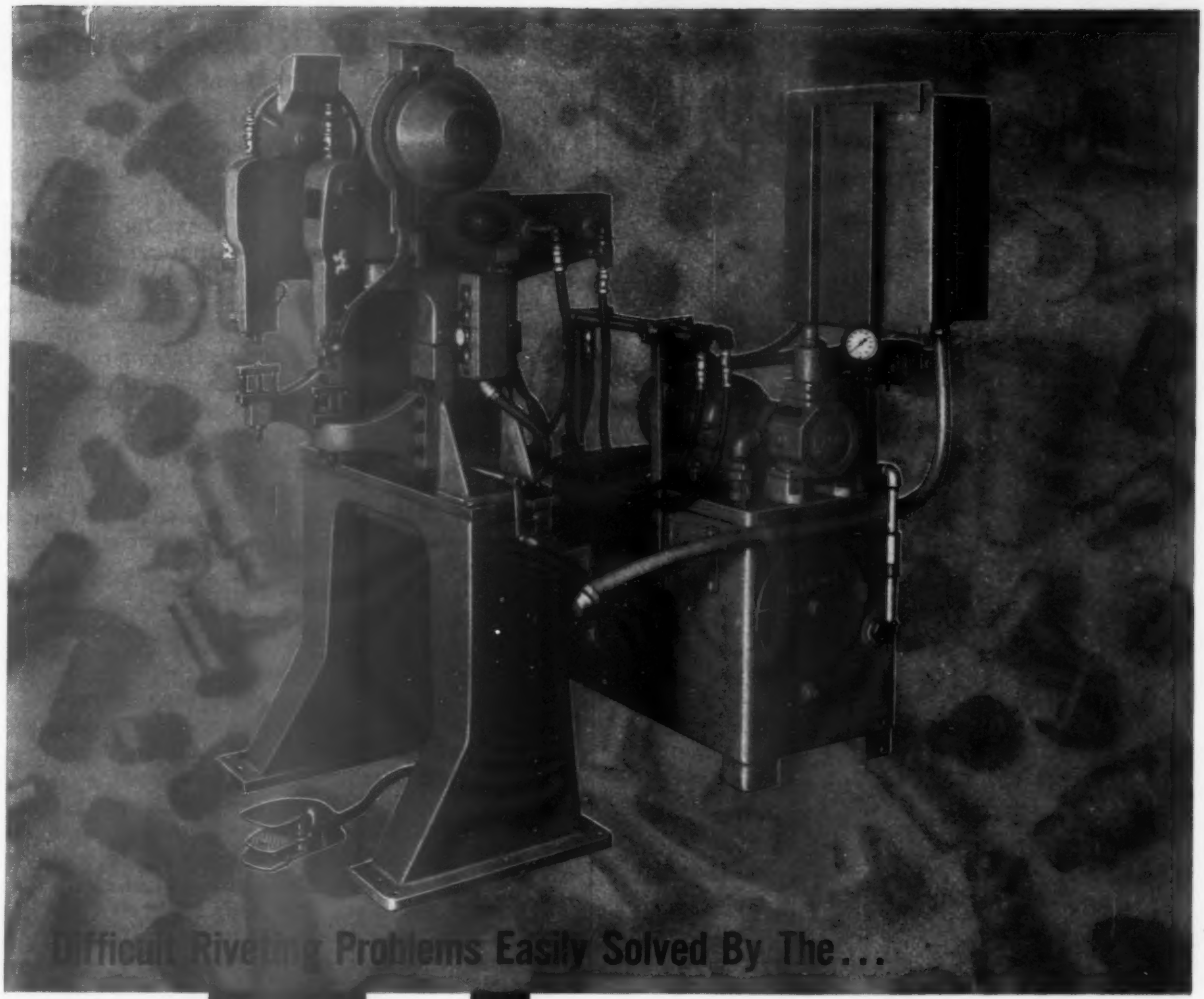
Following this treatment, the boards go to a flux dip, and then to an infra-red pre-heating station. The pre-heating eliminates all traces of moisture, and brings the boards to a temperature more compatible with the molten solder at the next station.

At the dip-soldering station, the operator manually inserts the boards in a series of fluoroplastic fingers which hold the boards during the automatic 4-second dip cycle. The solder dip process connects all wires, leads and components to the circuits printed on the boards. The solder adheres only to the component leads, eyelets and printed wiring. Average temperature of the solder is 470 to 490°F, but is raised to 500° for heavier deposits.

After the boards are removed from the solder dip they go to another hot detergent bath to remove traces of flux, and are air dried. The boards are again inspected to insure that there are no soldering defects before being assembled in the computers.

According to Gerald R. Henshaw, foreman in charge of the circuit board line, additional automated equipment and methods are now being studied for application to computer assembly. He emphasized that many satisfactory industrial techniques cannot be used for this type of work because of the extreme component and circuit tolerances and high degree of reliability required in the final product. This requires painstaking examination of automated equipment capabilities, and may result in costly re-engineering to meet computer specifications. •

After dip soldering, boards are hand brushed to remove excess solder. Following inspection, a hot detergent bath and rinse removes all traces of flux, grease or other contaminants. A final inspection follows. Shown in the rinse operation is the final board with all components attached.



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FASTENER SCHOOL ONE

"I learned more about thread-cutting screws in one day than I did in 20 years of selling them," said a distributor's salesman who attended one of Parker-Kalon's Fastener Specialist Training Programs. While the salesman unquestionably belittled his past experience, his enthusiasm is testimony to the value of one of the best company-sponsored, short training courses in the metalworking industry today.

Parker-Kalon has conducted its training programs for many years. At the present these programs take on additional importance because of industry's growing awareness of the production time which can be gained and the assembling costs which can be slashed through proper use of the right fastening method. To advise industry requires well-trained salesmen; hence, the P-K school to train its distributors' salesmen.

The school begins promptly on Monday morning at 9 and finishes Friday afternoon at 5. Not only is each day carefully planned, but there are evening sessions lasting until 9 p.m. Learning is the order of the day! Further testimony to the excellent manner in which the school is conducted is the fact that no "student" grumbles about the evening work.

Outstanding feature of the school is the actual application work conducted by the students. They not only operate testing equipment and learn about torque, but by taking typical applications are able to understand the relationship between hole size and the proper selection of tapping screws, gaining therefrom a basic, clear-cut understanding of the relationship which exists between hole size and screw size. No one who has completed the P-K course need ever guess at the hole size required for a type A #8 screw to be used on a metal thickness of .030-in. He knows the hole size should be .136-in. if it's pierced or extruded, and .120" if it's drilled. His actual work in the P-K lab has proved to him that a .140" hole reduces the holding power of the screw even though it's easier to position, while a .104" drilled hole exacts unnecessary power and energy to position the screw.

The actual laboratory work is not only limited

At the "fastener specialist training school," shop study helps combine the practical with the theoretical.

OF BEST IN INDUSTRY

to test applications, but goes into the realm of customer problems. 'Students' are given actual problems which have been posed to Parker-Kalon over the previous few months. They are handed copies of the letters and asked to prepare an answer to the problem, using P-K facilities to test their answers.

Among the typical subjects covered in the school (space does not permit us to give the complete curriculum) are the following: Need for the various types of thread-cutting and thread-forming screws and how they function; how to use tapping screws correctly; application requirements of thread-cutting and thread-forming screws; methods to produce screw engaging holes in various materials; methods used to drive thread-cutting and thread-forming screws; finishes on screws; weld screws; correct use of socket screws which includes the different types of points; the correct use of dowel pins.

A trip through the factory is included to familiarize students with manufacturing methods so they might gain an insight into economical manufacturing methods. This gives them the basis for correct price quoting to the user. Here they understand why it's cheaper to place a full order of 100,000 screws at one time and ship, than to order ten batches of 10,000 at six-month intervals, and why it's proportionately cheaper to order 30,000 screws than it is to order 20,000.

Because the school is for distributors, a portion of the course is concerned with sales, pricing, advertising and sales promotion. The entire distributor and sales program of P-K is explained in detail. This leads to a better understanding of mutual problems and results in a more highly coordinated union of manufacturer and distributor, reflecting in better service for the user.

Instructors for the course are P-K personnel, ranging from the president through manufacturing, engineering sales, advertising and research. A written examination is given at the end of the course. The examination is not a mere formality but is based on every aspect of the 5 day course and requires 1½ hours to complete, even with the assistance of all the notes the student has taken. •

FASTENERS FOR COLOR MATCHING OR CODING

by **F. K. Knohl,** Chief Field Engineer
Shakeproof Division, Illinois Tool Works

Many new products and techniques have been developed in recent years that permit manufacturers to add color to their consumer-products. Various types of paints, wax-free finishes, dyes, colored plastics and other items have proven their value in research laboratories and have found their way to the production line.

Aggressive companies were quick to capitalize on this boom in the use of color, and now offer models of their products that match, blend, or complement the consumer's color requirements.

However, color presents a problem for certain products where fasteners are visible. Some users have adopted complicated racking and dipping methods for painting screw heads, but the cost of this is excessive. To overcome this problem, our company has developed painted fasteners that match a manufacturer's specifications. One type is opaque, and will not chip. The painted finish also provides added corrosion protection.

Many types of fasteners are available with a paint finish, but we have found the most demand for painted screws. This is due to the fact that the screw head is visible. Painted fasteners should be considered wherever a decorative appearance is needed, either to match the product color, or to contrast with it for design reasons. Refrigerators, freezers, ranges, fans, laundry equipment, other appliances, as well as prefabricated buildings are typical applications.

In electrical assemblies of various kinds, painted fasteners can be used for color-coding—similar to the color-code system of wiring. Painted termination screws, for example, would eliminate the need for costly numbering as well as simplify identification.

Metallic finishes pose other problems of matching the fastener to the product. The structure of the material under a metallic finish changes in appearance. Also, intensity and the reflection angle of light play a part in deceiving the eye.

We have found that the fastener does not always need the same finish as the item to which it should match because a mirror finish can give the fastener a matching appearance. For example, a bright nickel or chrome finish on a screw in a counterbored hole will appear to be gold-plated if the surrounding area is a metallic gold.

Most fastener manufacturers offer a large variety of finishes, and it can be beneficial to the user to make the finish work for them, whether the job be to improve product appearance or to simplify identification. •

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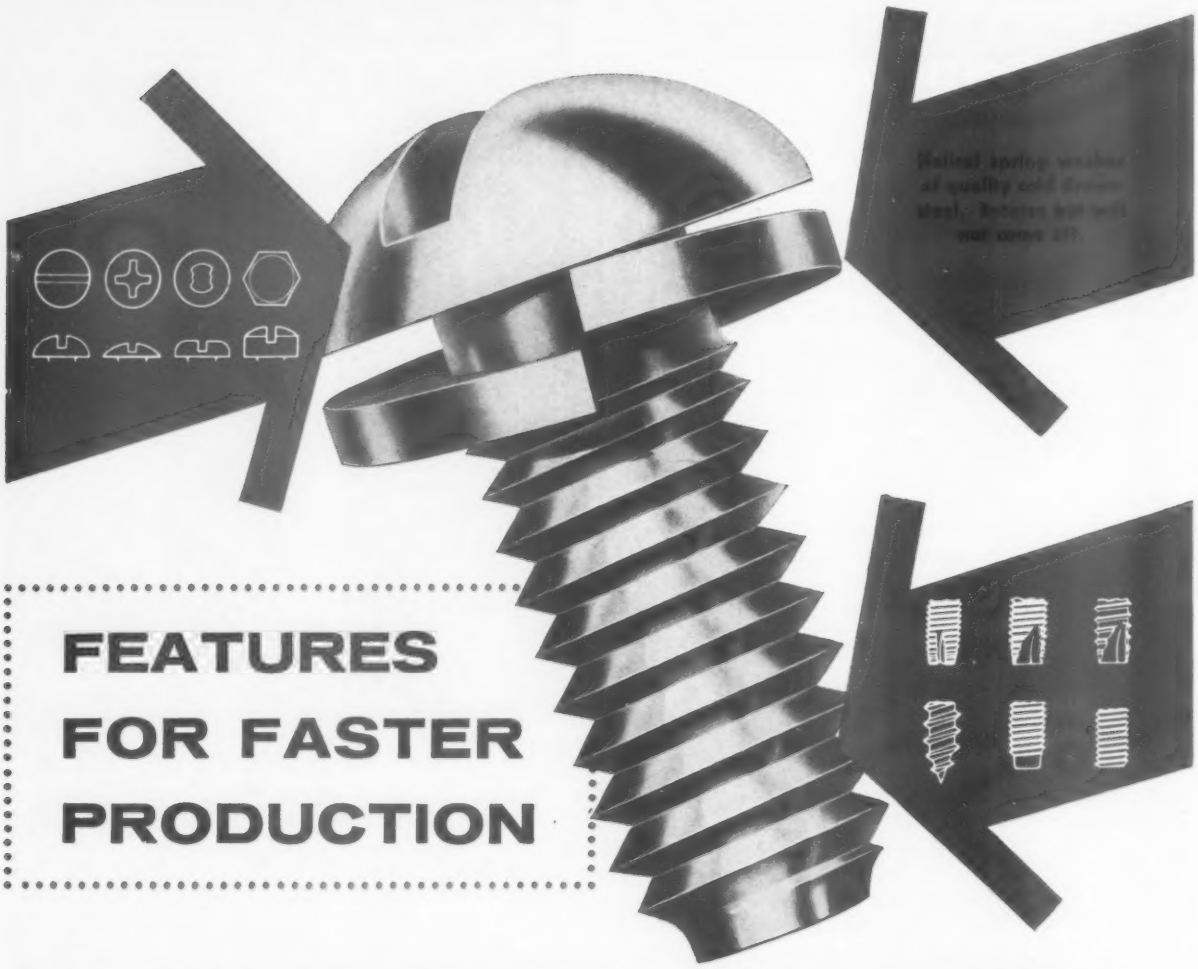

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Eaton-Reliance Springtites and Sems* are made to satisfy the needs of modern, high speed production in almost every field of metal fabricating. From design to final use, these fast fasteners offer features required by design and industrial engineers to make better, longer lasting products. With quality cold drawn steel as a foundation, Eaton-Reliance Springtites and Sems are headed and threaded on precision machines; the spring washer is added as a permanent part of the fastener and all work is inspected with a critical eye toward perfect performance under the most trying conditions. Products fastened with Eaton-Reliance industrial fasteners stay "factory tight" longer. Send for Engineering Bulletin S-49, or for threadcutting Springtites and Sems in Types 1-23-25, send for Engineering Bulletin S-49-A.

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assembly and fastener engineering

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281	282	283	284	285	286	287	288	289	290
291	292	293	294	295	296	297	298	299	300
301	302	303	304	305	306	307	308	309	310

EDITORIAL ITEMS

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
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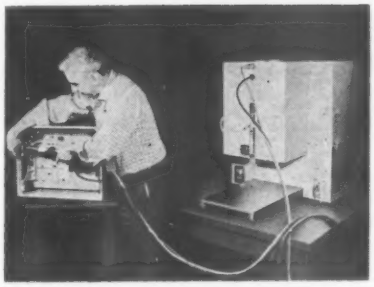
WHAT'S NEW IN EQUIPMENT

For information on any equipment listed here, use the postpaid card opposite this page. Just circle the number on the card matching the number following the description. We'll do the rest.



(See 3)

ANGLE ATTACHMENTS FOR POWER ASSEMBLY TOOLS

Nut setting and screw driving, as well as drilling, burring, rotary filing, grinding and polishing, can be done at 45°, 90° or inverted 45° angles with angle attachments for power hand tools.

Production and maintenance type units are suited for use up to 7000 rpm. Attachments have ball or needle bearings, integral gears and heat treated alloy steel shafts. Small housings permit use through a 1⅝" hole.

Monument Engineering Co., Drexler Div., 1625 Bellefontaine St., Indianapolis, Ind.

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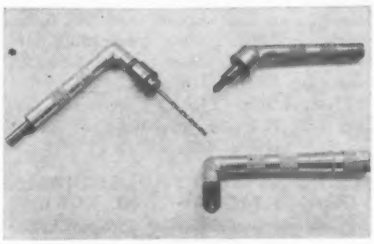

(See 1)

HYDRAULIC DUAL MACHINE SETS ¼" RIVETS

A hydraulic dual riveter is tooled to set two ¼" diameter solid steel rivets that are gravity fed from two 10" hoppers.

The Model HDR Rivitor's operating cycle is .8 of a second at 420 psi oil pressure when setting to ¼" rivets, and has a maximum operating pressure of 1000 psi.

The unit includes two riveting stands with 8" throat depth that are adjustable to spacing from 1½" minimum to 18" maximum, center to center.

Equipment conforms to JIC specifications, while the control panel is in NEMA type No. 12 enclosure.

Tomkins-Johnson Co., Jackson, Mich.

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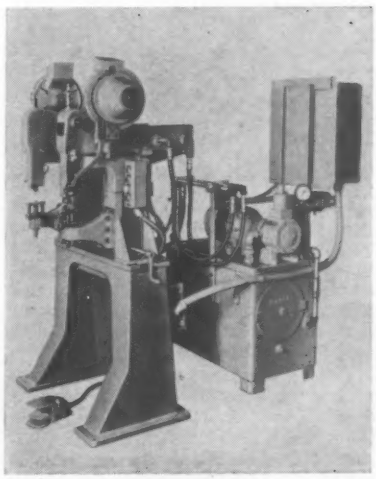

(See 2)

AUTOMATIC GUN FEEDER-DRIVER FOR SET SCREWS

The advantages of automatic socket set screw feeding and driving are now available in a portable machine.

Not only can the machine itself be moved from one location to another, but the gun-type driver will automatically receive and drive screws at distances 15 feet or more from the machine, as many as 2000 standard socket set screws per hour.

A screw is fed to a selector from a rotating hopper. From the indexing mechanism, the correctly positioned screw is carried by air through a flexible tube to the driving gun. The set screw is then seated to a preset depth or torque by the air-powered gun.

The Bristol Co., Waterbury 20, Conn.

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ASSEMBLY LOTION PROTECTS HANDS FOR 12 HOURS

A protective lotion is designed for the assembly line worker with hands exposed to chemicals, oils, grease, solvents, plastics, and paint. Vanfaire protects against resulting rashes. Applied like any hand lotion, it is soluble in soap and water and protects the hands up to 12 hours. After many tests it is now being used widely by the plastic, aircraft, electronics, and chemical industries on the West Coast.

Vanfaire Co., 10732 Riverside Dr., North Hollywood, Calif.

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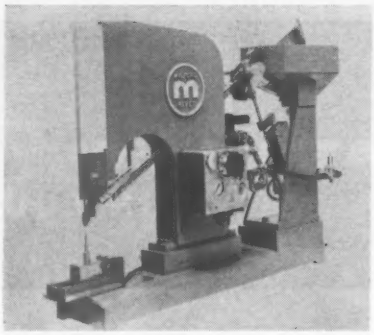
PNEUMATIC RIVETER WITH BLADE HOPPER ATTACHMENT

The Model 56-BH riveter embodies a narrow cross-sectional area of machine front, allowing for single or multi-spindle arrangement. Attachment of blade hopper permits straight "in-line" feed of difficult-to-feed parts such as long tubular rivets, collar studs and threaded or knurled parts.

The setting machine portion is actuated by a pneumatic cylinder which drives the setting tool through toggle linkage. The blade hopper is independently driven through a separate air cylinder. The hopper system may be continuously cycled or operated intermittently. Both drives operate from a single air and lubricating control off shop air from 60 to 150 psi.

The 56-BH can be used in conjunction with fixed position setting tools, in line slide fixtures or rotary tables to suit a wide range of product applications and assembly operations.

Throat depth of the machine is 9"; stroke, 2". When equipped with a fixed position tool, the maximum rivet length capacity is ¾"; when equipped with slide fixtures the maximum capacity is 1½".



Tubular rivet diameters can be handled to a maximum of ⅛". Larger diameter shanks can be handled if the part is only to be inserted or loosely clinched.

Milford Rivet & Machine Co., Milford, Connecticut.

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PORTABLE ARC-SPOT GUN WELDS FROM ONE SIDE

Spot welds can be made from one side of sheet metal work with a light, automatically-timed portable gun.

Model G gun is pressed against work for welding. No triggers or levers to operate. Current shuts off automatically after predetermined time set on control dial. It is used with power source of 100 amp. at 35 volts open circuit.

Brennen, Bucci & Weber, Inc., 262 Mott St., New York 12, N.Y.

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DOUBLE-TRIP RIVETER WITH TOE-TOUCH CONTROL

Model 81JG riveting machine is designed to provide a controlled pause in the setting cycle, during which the operator can accurately position the workpiece with respect to the rivet which is poised above but not touching the work.

This point of interruption is adjustable to rivet length and work thickness. When work is aligned, the operator releases the foot switch, and the machine completes its cycle. Because the secondary jaw motion to permit final alignment is an automatic part of the electrically-controlled cycle, instead of being manually controlled through a conventional treadle, total cycle time is almost as fast as for an unbroken cycle.

Throat depth of the machine is 10" with a stroke of 2" or 2¾". Capacity is .200" steel rivets for light setting, or .160" steel for heavy setting.

Tubular Rivet & Stud Co., Quincy 70, Massachusetts.

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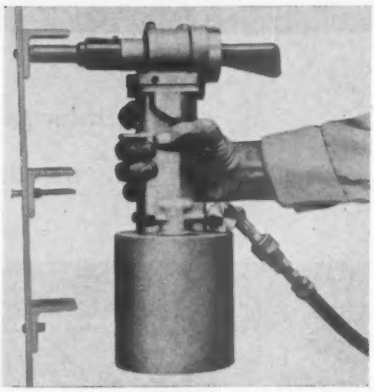
AIR GUN PULLS LOCKBOLTS TO 11,000 LBS. AT 100 PSI



A lightweight, pneumatic lockbolt installation gun is a short stroke, high pin break tool that develops up to 11,000 lbs. of pull at 100 psi air pressure.

Like the companion Cherry G-85 gun, the G-87 can be used at pressures up to 125 psi with a corresponding increase in pulling power without damaging the gun.

The gun installs lockbolts from 3/16" through ⅜" diameter, including the five-groove high break load pin in all materials. Pulling nose assemblies currently used with other pneumatic lockbolt guns fit the G-87.

Cherry Rivet Div., Townsend Co., Box 2157-Z, Santa Ana, Calif.

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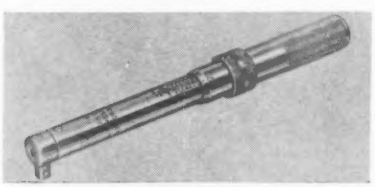
MICROMETER-TYPE AUDIBLE TORQUE MEASURING TOOL

A torque tool tells the operator when the pre-set torque has been reached clicks at the desired torque, eliminating glancing at dials and scales. After release, it automatically resets itself.



The Micro-Set measures torque in both left and right directions without adaptors. It is helpful in close quarter tightening in electrical and instrumentation work, aircraft, production testing, concealed areas, automatic transmissions. It can be provided with a ratcheting head.

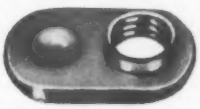
The tool is easily set to the desired torque throughout its wide range. Rotate barrel until micrometer graduations line up at torque, and lock. Setting will not slip or change. Rugged and dependable, the Micro-Set comes

OHIO WELD FASTENERS

AS THE PRIMARY FASTENERS IN FASTENER ASSEMBLIES MEAN . . .

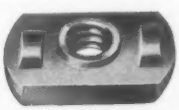
- LIGHTNING-FAST APPLICATION BY RESISTANCE WELDING
- PRIMARY FASTENER PERMANENTLY POSITIONED –NO RETAPPING NECESSARY
- SPLIT-SECOND ASSEMBLY OF PRODUCT COMPONENTS – MADE POSSIBLE BY PRE-ATTACHED PRIMARY FASTENER

XN NUT with precision pilot and recessed target electrode area. Provides optimum weld even with light spot-welding equipment.



PN NUT Used where a pilot for easy locating, a strong weld and space limitations are important factors. Ideal for use in confined corners, flanges and narrow channels.

WF NUTS Used where the nut serves a mounting purpose or greater thread engagement is required than is normally provided by other type weld nuts.

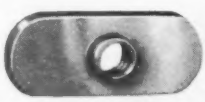


RN NUT with pilot and dual-line projections. Ideal in applications where tension is against the weld.

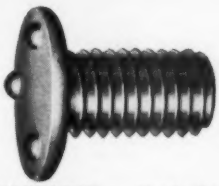
WS NUT For applications on rugged assemblies where it is necessary to anchor nut securely in blind location.

RH NUTS Used where it is desirable to have the body of the nut go through the sheet or where extra long thread engagement is needed.

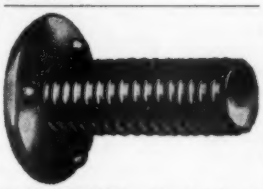
WW NUTS used where a hermetic seal is required to prevent leakage of air, gas, water or dust on blind locations.



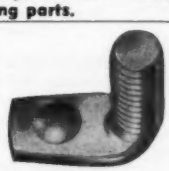
ND NUT Used where a large nut is needed for bridging or joining two sheets or for extra strength.



GW SCREWS — Used where design requires a smooth unmarred surface and a fastener permanently fixed in place.



HW SCREWS—Used where a self-locking through bolt is required to be fixed securely in place so that it will not turn and flush surface is required for attaching mating parts.



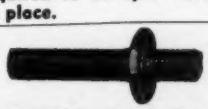
DW SCREWS—Used where a projection weld screw is required and confined location necessitates a narrow head.

PD SCREWS—Used where it is desirable to place a threaded section on the edge of a sheet.

HH SCREWS—Used where a single, button-type projection is required when welding to curved surfaces, to heavy sheet 3/32 " or thicker, or to ends of rods.

RW SCREWS—Used where a hermetic seal is required to prevent leakage of air, gas water, oil or dust, or when welding to perforated metal or wires.

SS SCREWS—Used where a screw with narrow head is required to be spot welded in place.



CS SCREWS—Used where a hermetic seal and a screw are needed on both sides of the sheet as on transformer can relay points.

Samples and information available upon request.

The OHIO WELD FASTENERS Primary Fastener in Fastener Assemblies

THE OHIO NUT AND BOLT CO.

33 FIRST STREET · BEREA, OHIO

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with square drive, fitting all popular ratchet wrench extensions.

Apco Mossberg Co., 1006 Lamb St., Attleboro, Mass.

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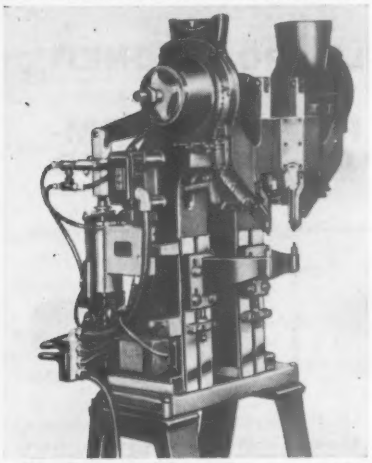
PNEUMATIC RIVET SETTERS FOR AUTOMATIC OPERATION



Fragile materials such as ceramics and plastics are said to be riveted with a minimum of breakage with pneumatic rivet setters. The new line includes single and multiple setters as well as machines for integration into automated operations. Air line pressure requirements are 50 to 60 lbs. Controls are electric.

Cushioned operation also makes the machines suitable for fastening assemblies of uneven thicknesses.

Illustrated is model 180 double rivet setter which has a throat depth of 6" and will set two .098" steel tubular or two ⅛" brass tubular or split rivets at the same time. Maximum rivet length that can be set is 7/16" long. Centers are adjustable from ⅜" to 6".

Quick-change hoppers with integral raceways permit setting of other rivets of smaller body diameter and within the maximum rivet length. Change over for different rivets involves replacement of rivet hopper-raceway unit, driver jaws and anvil.

Chicago Rivet & Machine Co., 950 South 25th Ave., Bellwood, Ill.

Use postpaid card. Circle No. 10

DIAL FEED INDEX WITH PRESS SPEEDS TO 280 SPM

A new dial index feed features a completely different indexing motion at press speeds as high as 280 s.p.m., as well as increased shut height on the press. The feed is equipped with a choice of 12" or 15" table diameters and has provisions for either 10 or 12 stations.

Total table height has been reduced to 2⅜", a saving of 1/3 over model previously offered. On the Benchmaster 5-ton press illustrated, this now makes a total shut height available of 4½" (ram down, adjustment up). The dial index is so made that it can be adapted to virtually any press. The dial feed requires no extra mounting plate; attaches directly to the press bolster area.

Positive and extremely accurate indexing is accomplished with a 6½" diameter indexing gear, vee notched in its periphery.

Benchmaster Mfg. Co., 1835 W. Rosecrans Ave., Gardena, Calif.

Use postpaid card. Circle No. 11

ELECTRODE DESIGNED FOR HIGH SPEED PRODUCTION

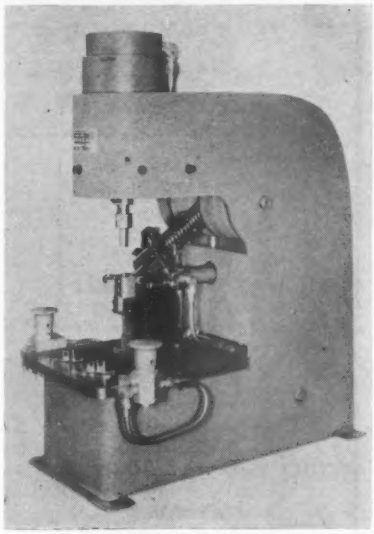
An electrode, E6012 classification, contains iron powder added to the coating to increase the deposition rate over ordinary E6012 electrodes.

Designed for welding mild steel in the flat, vertical and overhead positions on high speed production work, 12A is well adapted to lap seam welds because of lack of wash-back and gouging at high amperages. It is available in ⅛" and 5/32" dia. in 14" lengths, 3/16" dia. in 15" lengths, and 7/32", ¼" and 5/16" dia. in 18" lengths. Standard containers are 50 lbs. each.

Hobart Brothers Co., Troy, Ohio.

Use postpaid card. Circle No. 12

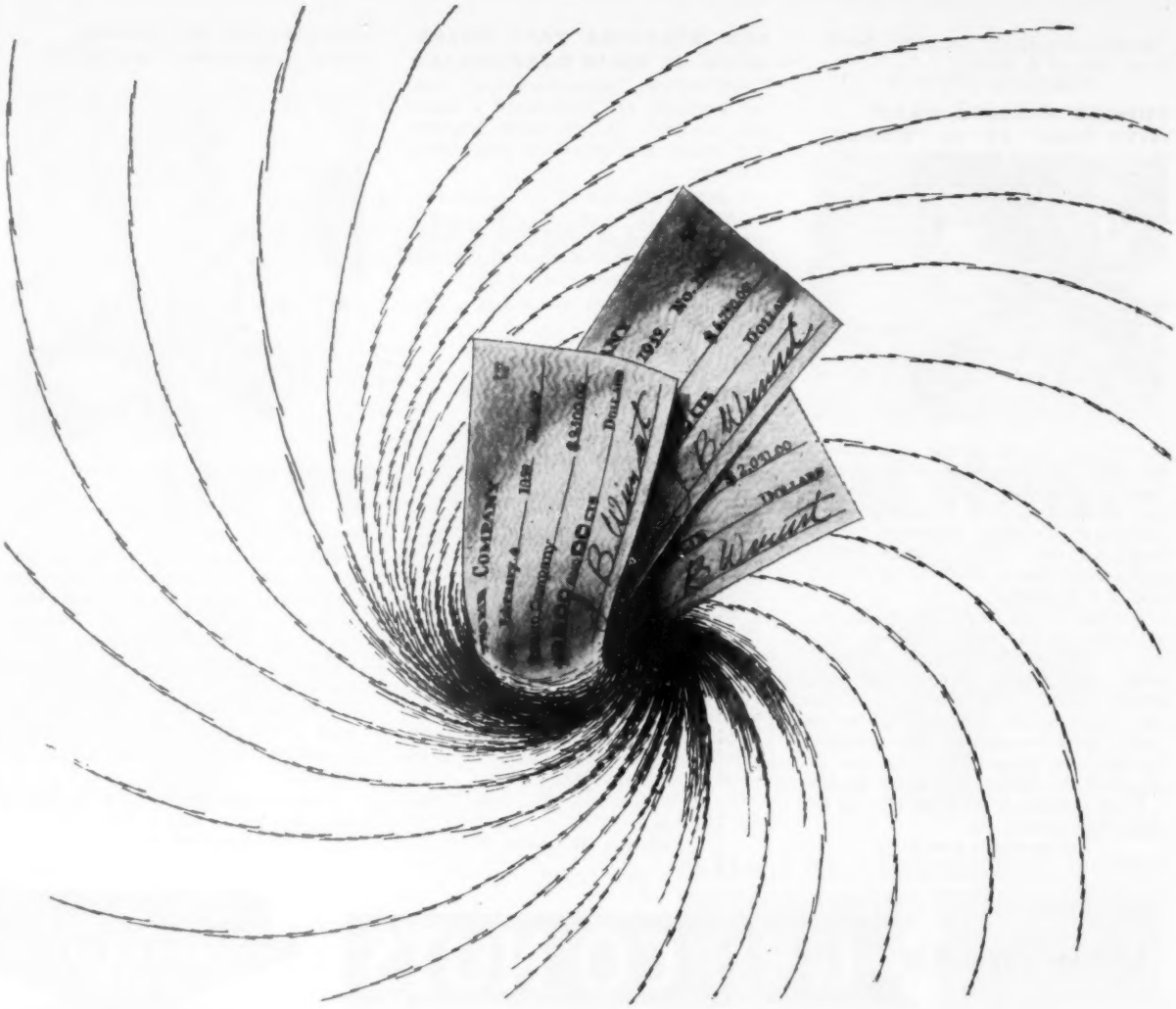
BENCH TYPE DRIVER FEEDS, ASSEMBLES PARTS



A small parts feeder, with gentle oscillating action, has been built into a bench-type driver frame. The feeder orients a continuous supply of parts for the assembly operation without the disadvantages of overfeeding and back pressure.

The Hopperal may be equipped with a solenoid, air or hydraulic powered driver which is used to drive, peen, press or stake the part being fed into the assembly. It can be operated with hand or foot valves for semi-automatic cycling, or equipped with air or electrical controls for fully automatic cycling.

The unit has a fixture mounting surface to permit locating fixtures to be mounted on the driver. A feature of the machine is the possibility of providing more than one track and staking head.



How you can improve your company's profit in assembly operations

Assembly costs are 50-75% of manufacturing charges. Direct labor charges are 81% of that figure while fasteners account for only 19%. Your biggest opportunities for profit improvement, then, lie in reducing the direct labor costs of assembly.

So the saving of a few cents a thousand on the cost of fasteners isn't so attractive when the failures show up. A unit pulled from the production line because of a stripped thread; rejects; more frequent inspections . . . all these eat up your profits.

We believe that quality is what smart industrial buyers really want. And we back up our belief with continuous research to find fasteners that will perform better, cost less, last longer and be easier to use.

It is this belief in quality which underlies our Profit Improvement Program for you — because nothing improves your profits like a quality product that helps you cut your costs.

Profit Improvement Program

In every phase of modern fastening and assembling — new products, new applications, new packaging, quality control — American's Profit Improvement Program spells more profit for you. Ask your American Screw Company salesman about these ideas you will find profitable.

The Biggest News in Fasteners comes from

American
SCREW COMPANY

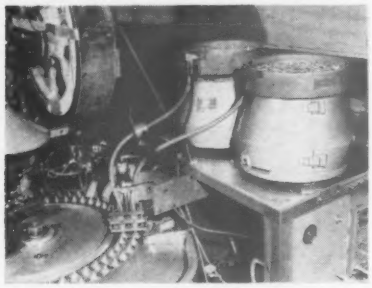
Willimantic, Conn. • Detroit, Mich. • Chicago, Ill.

Use postpaid card. Circle No. 235

Haberstump-Harris, Inc., 10463 Northlawn, Detroit 4, Mich.

Use postpaid card. Circle No. 13

THREAD ROLLING HEAD WITH 7/16" TO ⅞" RANGE



A revolving type thread rolling head has been developed for application to Landis automatic forming and threading machines and 4-spindle semi-automatic threading machines. Designated the No. 7 TRP (Thread Rolling pull-off), it has a 7/16" to ⅞" U.N.F. and U.N.C. range.

Feature of the new head is the replaceable helix angle bushings. One set of bushings functions as a "mean" helix angle for the entire U.N.F. and U.N.C. pitches and diameters within the range of the machine. When the exact helix is required for precision threads, the proper bushings can be supplied to obtained precision threads.

Landis Machine Co., Church and 5th Sts., Waynesboro, Pa.

Use postpaid card. Circle No. 14

SELF-STACKING TOTE BOXES MADE OF RIGID CORRUGATED

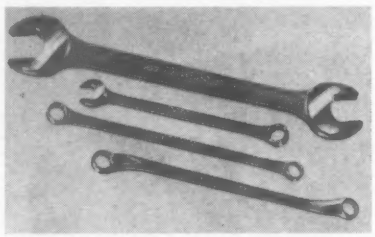
Self-stacking hopperfront tote boxes are fabricated of Chem-Board, a material produced by chemically rigidizing heavy corrugated to exceptional strength.

Inside dimensions of the boxes (No. J-120) are 19" wide, 28" long; depth when stacked is 13½". Solidity of stacking is accomplished by sturdy front and back shoulders of each box.

Convoy, Inc., 3459 Navarre Rd., Canton 6, Ohio.

Use postpaid card. Circle No. 15

OPEN-END WRENCH LINE

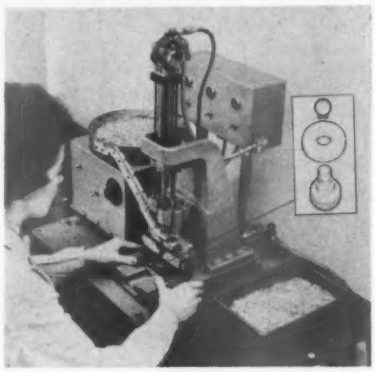


A line of open-end, combination box-open end and 15° and 45° offset box wrenches features slim, comfortable handles, smooth contours and strong, thin heads that allow maximum clearance in close quarters.

J. H. Williams & Co., 400 Vulcan St., Buffalo 7, N. Y.

Use postpaid card. Circle No. 16

AUTOMATIC RETAINING RING ASSEMBLY MACHINE



A fully-automatic, hopper-fed retaining ring assembly machine is designed for high-speed assembly of Truarc external-type rings.

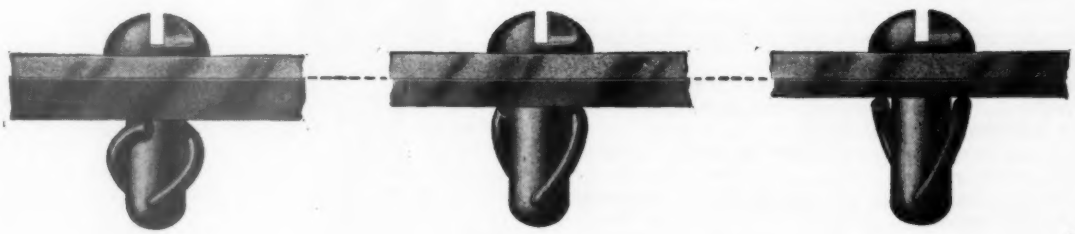
The usual practice is to furnish customers only the basic ring-dispensing components together with schematic blueprints from which the customer can construct his own assembly station.

The machine pictured was designed for installing a Series 5100 ring on a control knob stud-and-disc assembly. With a few modifications, it could be adapted to other ring types and assemblies.

Waldes-Kohinoor, Inc., 47-16 Austel Pl., Long Island City 1, N.Y.

Use postpaid card. Circle No. 17

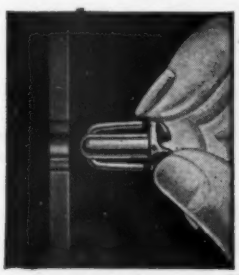
This fastener works through thick and thin!



Spring-Lock—the easy-to-use removable fastener for modern designs—works whether panel thicknesses run over or under specifications! Spring wire deflects automatically to handle greater or lesser thicknesses. Spring-Lock's design flexibility makes it more than a fastener: it can be adapted as a shelf support, door strike, knob or any similar panel-mounted device. Many standard shapes and sizes of Simmons Spring-Locks are available from stock.

SEND TODAY for your copy of the NEW 40-page Simmons Catalog. Complete information, engineering drawings, and application data on Spring-Lock and other Simmons Fasteners. Engineering service is available. Samples on request.

HERE'S HOW SPRING-LOCK WORKS



1. *Insert fastener.*

2. *Half-turn locks it in place.*

With production costs on the uptrend, you can figure on Spring-Lock as an assembly time and money-saver, because:

- **Installation is BLIND**
- **Installation is EASY: no special tools are needed**
- **Installation is QUICK: a half-turn locks it in place**
- **Installation is SECURE: the *spring* steel *locks* the fastener, resists vibration**

SIMMONS FASTENER CORPORATION 1796 North Broadway, Albany 1, New York

QUICK-LOCK • SPRING-LOCK • LINK-LOCK • HINGE-LOCK • ROTO-LOCK • DUAL-LOCK

See our 8-page condensed Catalog in Sweet's Product Design File.

Use postpaid card. Circle No. 238

Announcement of Major Significance

FOR EVERY USER OF SOCKET HEAD CAP SCREWS

Following exhaustive studies begun in 1954, the socket screw products industry adopted, on April 24, 1959, new dimensional standards for socket head cap screws. Standard Screw Company participated in these studies and concurred in the recommendations approved by leading fastener manufacturers.

Adoption of the new standards, to be known as the "1960 Series", has important implications for every user of socket screws. As a public service Stanscrew will point out these implications . . . not only in relation to its own products, but also to the overall program of the industry.

Differences, Advantages Of New Design

The "1960 Series" has been carefully engineered so there is functional uniformity for all sizes, particularly as it applies to wrenching areas and to the relationship of head diameters to body diameters. For most sizes, as illustrated, this means substantial increases in both head diameter and socket size, and thus provides these advantages over the present design:

1. *Maximum utilization of the fastener's inherent strength . . . larger wrenching area permits application of greater clamping force.*
2. *Increased bearing surface under the head . . . up to 233% more.*
3. *Minimum indentation . . . particularly important with softer metals.*

Should You Convert Now?

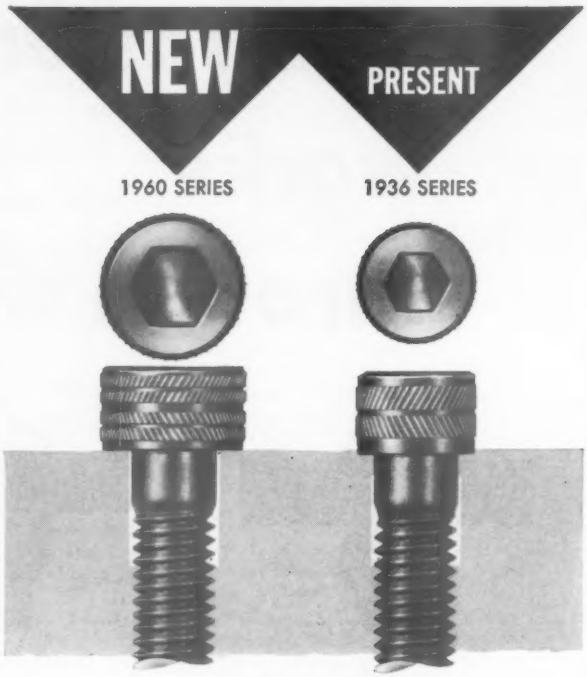
Obviously, for many applications, the new design offers important benefits which indicate conversion as rapidly as possible. In some cases, however, existing product design may not accommodate the larger heads . . . or, where socket cap screws are countersunk, revising your countersinking operations may create significant production problems. Stanscrew urges, therefore, that each company learn complete facts on the fastener industry's future plans.

Timetable For Industry Changeover

Stanscrew has already started production of the new "1960 Series". Manufacture of the present (1936) series will continue, however, and they will be available as standard, in-stock items until at least January 1, 1961. At that time, it is now contemplated the "1960 Series" will become the accepted standard throughout industry and the "1936 Series" will then be furnished only when specifically ordered.

When Designing A New Model

For products now on the drawing board, this timetable indicates many manufacturers should plan to use the "1960 Series" as the standard for later production. By making such design provisions, you assure maximum acceptance and minimum difficulty in the future.



For Existing Products

For many existing applications, where socket cap screws are not countersunk, either the 1936 or the "1960 Series" may be used. In frequent cases, improvements of the 1960 design suggest conversion within a short period. In other applications, where the heads are countersunk or where the greater head diameters of the "1960 Series" create a problem, changeover should probably be postponed until a general redesign of your product is scheduled.

Special Stanscrew Marking

To further distinguish its "1960 Series", Stanscrew will knurl heads of all new style socket cap screws with a split herringbone design (as shown). This special marking and the new "1960 Series" box labeling will provide quick identification of these quality fasteners.

For Further Information

Your Stanscrew distributor has the latest facts on the new "1960 Series" and will be happy to discuss them with you. If desired, he also will arrange for a prompt visit from a Stanscrew fastener specialist who will be most happy to go over all aspects of this new industry program as it regards your own particular operation.

Stanscrew also has a new brochure which provides complete dimensional and design data on the "1960 Series". No obligation, of course, for your copy.

STANSCREW FASTENERS

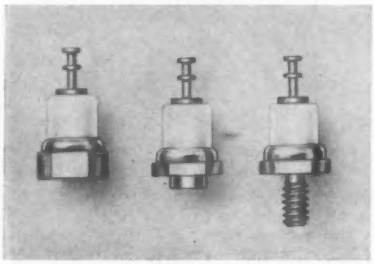
CHICAGO | THE CHICAGO SCREW COMPANY, BELLWOOD, ILLINOIS
HMS | HARTFORD MACHINE SCREW COMPANY, HARTFORD, CONNECTICUT
WESTERN | THE WESTERN AUTOMATIC MACHINE SCREW COMPANY, ELYRIA, OHIO

STANDARD SCREW COMPANY 2701 Washington Boulevard, Bellwood, Illinois

Use postpaid card. Circle No. 239

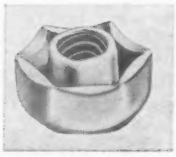
WHAT'S NEW IN FASTENING AND JOINING

For further information on any of the fasteners listed here, use the handy postpaid card opposite page 51.



(See 26)

(See 30)



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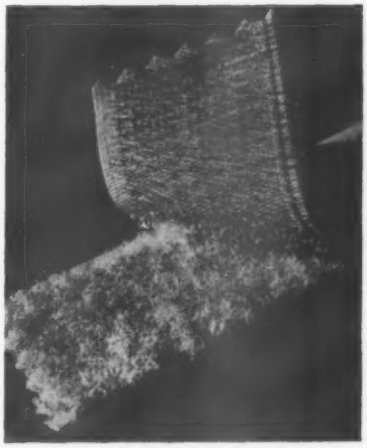


(See 28)

SOLDER TERMINALS ARE TEFLON INSULATED

Teflon insulated terminals are especially useful under severe conditions of humidity.

The units, designated No. 1945, 1946, and 1947, have a double turret type solder terminal seated in Teflon. They are available with three types of mounting studs: external threaded, rivet type, internal threaded.

External threaded and rivet type terminals are 9/16" high when mounted; internal threaded type 5/8" high. All are 3/8" in diameter. Internal threaded type is available with No. 6-32 thread or No. 4-40 thread. Mounting studs and solder terminal are brass per QQ-B-626a. Studs are electro-plated as specified. Terminals are tin lead solder plate unless otherwise specified.

Cambridge Thermionic Corp., 445 Concord Ave., Cambridge 38, Mass.

Use postpaid card. Circle No. 26

STRONG BRAZING ALLOY MELTS AT 1185°F

A copper (80%)-phosphorous (5%)-silver (15%) alloy for brazing nonferrous metals has an original tensile strength of 86,000 psi. It melts at 1185°F and is completely fluid at 1300°F.

To be used only on copper, brass and bronze, Phos-Sil 15 is said to produce a bond stronger than the metals joined. Joints have high thermal and electrical conductivity.

American Brazing Alloys Co., Box 11, Pelham, New York.

Use postpaid card. Circle No. 27

WOVEN NYLON STRIPS FASTEN LIKE BURRS

A woven nylon tape consists of two strips—stiff little hooks and soft nylon loops. When lightly pressed together, the resulting engagement is said to be highly adjustable, secure and lightweight.

The closure can be opened and closed over 30,000 times without loss of holdpower.

The washable material has varied industrial applications—including appliance, transportation and automotive. It comes in varied colors and is applied by sewing, stapling, bonding or heat sealing.

Velcro Sales Corp., 681 Fifth Ave., New York 22, N.Y.

Use postpaid card. Circle No. 28

SELF-LOCKING HEX NUT FOR HIGH-TEMPERATURE USE

For high-temperature and nonmagnetic applications in 4-40 thread size, a stainless steel, self-locking hex nut is now available from stock. Part number is 97-40W.

Nutt-Shel Co., Inc., 2701 S. Harbor Blvd., Santa Ana, California.

Use postpaid card. Circle No. 29

CAP NUTS INTRODUCED TO FASTENER LINE

Cold headed cap nuts have been added to a fastener line. Produced on highly automated equipment, the cap nuts are available in steel, brass and aluminum. Sizes: No. 4 through 1/2". Samples.

Jacobson Nut Mfg. Corp., Box 177, Kenilworth, N.J.

Use postpaid card. Circle No. 30

NO TORQUING NEEDED WITH KNURLED BOLT, LOCK NUT

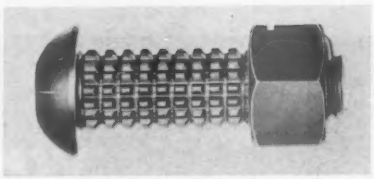
In applications where high clamping force is not needed or cannot be obtained due to difficult in torquing the nut, a semi-finished, self-locking hex nut will do the job when used with a knurled bolt.

Anco nuts also eliminate the need for washers, claims the manufacturer. In structural assembly, torque wrenches are not needed.

The under side of the head of the high tensile structural rib bolt is tapered, so that greatest bearing is near the outside of the head. This, it is said, helps divert stresses away from the bolt hole.

The relatively hard, front-tapered knurls make the bolt easy to drive. They burnish grooves in the connection holes, but don't peel while being driven. This prevents any packing of material under the bolt head.

Also, the bolts are in bearing when



installed, even before the joint is loaded. The "interrupted rubs" fill the connection hole to create a joint in initial bearing. Drawing up the lock nut until it is tight is all that is necessary. The maker says it won't work loose, regardless of vibration.

Automatic Nut Co., Lebanon, Pa.

Use postpaid card. Circle No. 31

HIGH TENSION (125,000 PSI) LOCKING FASTENERS

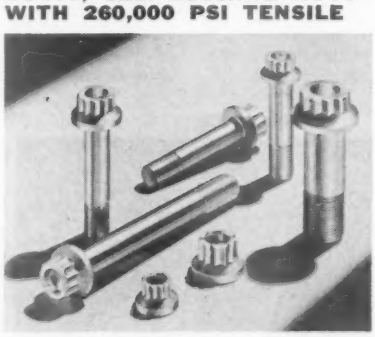
Flanged screws and nuts lock with ratchet-like teeth and with high thread tension to provide a high off-torque to on-torque ratio.

The carburized teeth the one-piece screw and nut are angled on the advancing side to allow low-friction tightening but are vertical on the back side to prevent loosening. In addition, a circular groove in the flange increases diaphragm action, flexing the flange as teeth imbed upon seating to help maintain residual tension in the fasteners. The Tensilock requires nearly 150% of application torque to loosen.

Russell, Burdsall & Ward Bolt and Nut Co., 103 Midland Avenue, Port Chester, N.Y.

Use postpaid card. Circle No. 32

BOLTS, SELF-LOCKING NUTS WITH 260,000 PSI TENSILE

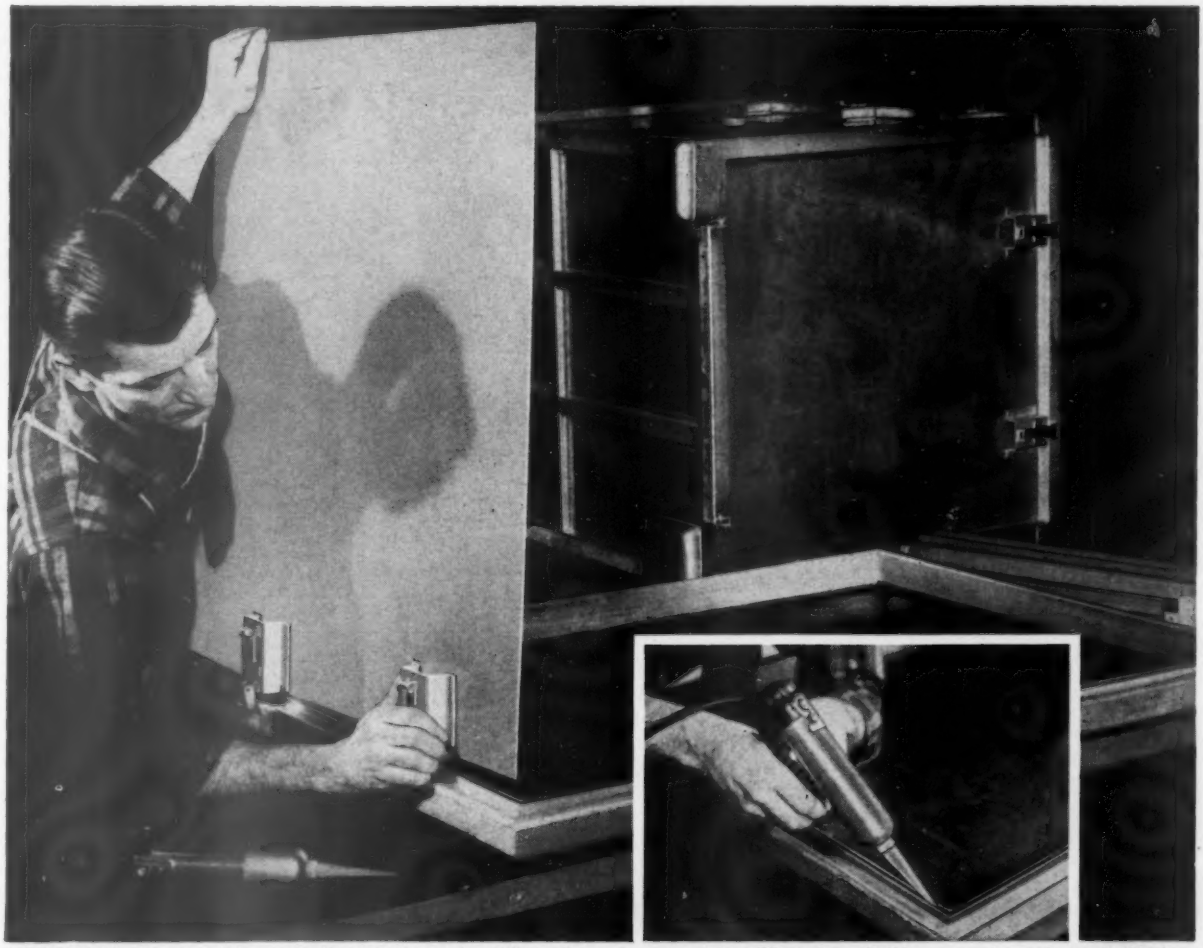


Companion steel bolts and self-locking nuts have a minimum tensile strength of 260,000 lbs. psi.

A single super bolt 1¼" in diameter, largest size now in production, is claimed to support a load of 146 tons.

Threads are rolled onto the EWB 26 bolts at a Rockwell C-scale hardness of 51 minimum. The FN 26 nut has 12-point-drive. The bolts are fabricated

How 3M Adhesives solved this Modular Packaging System problem



A FLOW GUN is all you need to apply EC-1386. It contains 100% solids and is solvent free. Waste is negligible; no pre-drying is required before joining sections. The adhesive bond can be cured to high ultimate strength quickly in an air-circulating oven (one to two minutes at 500°F).

The Zero Manufacturing Co., Burbank, California, faced a structural joining problem in its Modular Shipping Containers.

The containers were essentially a framework of slotted aluminum extrusions fitted with stressed aluminum sheets. With thin gauge metals, riveting lacked necessary strength and water-tightness; welding produced distortion and costly after-finishing.

Then, 3M Adhesive EC-1386 was chosen to solve the problem. This high-strength adhesive met every requirement. It sealed as it bonded. Total contact area joining provided the required strength. Other advantages included the elimination of drilling and riveting, welding and after-finishing operations. And the use of EC-1386 was accomplished with relatively unskilled labor and with low capital investment. And so, another company discovers—3M adhesives save time, save money, simplify production.

SEE WHAT 3M ADHESIVES CAN DO FOR YOU!

Contact your 3M Field Engineer. Or, for more information and free literature on 3M's complete line of adhesives, write on your company letterhead to: A.C.&S. Division, 3M, Dept. SAZ-89, St. Paul 6, Minnesota.

ADHESIVES, COATINGS AND SEALERS DIVISION

MINNESOTA MINING AND MANUFACTURING COMPANY

. . . WHERE RESEARCH IS THE KEY TO TOMORROW

3M COMPANY

Use postpaid card. Circle No. 260

from 5% chromium steel of the Vasco-Jet 1000 type. They are cadmium plated.

Minimum properties are: tensile, 260-000 psi; yield, 215,000 psi; shear, 156,000 psi; fatigue, 135,000 psi (at 65,000 cycles with 10% preload).

Standard Pressed Steel Co., Jenkintown, Pennsylvania.

Use postpaid card. Circle No. 33

EXPANSION NUT FOR THIN METAL ASSEMBLIES

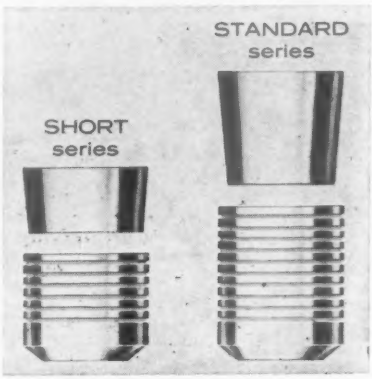
A quick-attachment expansion nut has been designed for applications where tapped holes are needed in thin sheet-metal assemblies and is available in six standard thread sizes.

In operation, the assembly is fed into square holes where the arched bars are straightened by an inexpensive tool to positively lock the nut in place. This action also opens the retainer sufficiently to permit the nut to float for easy alignment. An important feature of the nut is that it can be attached to a panel without having to support the panel. This permits attachment at any assembly point in a process.

The McLaughlin Co., 212 Jaikins Bldg., Birmingham, Michigan.

Use postpaid card. Circle No. 34

PIN PLUGS SEAL CASTINGS, PARTS UP TO 40,000 PSI



Pin plugs designed for hydraulic and pneumatic systems, as well as fuel control systems, seal effectively against pressures up to 40,000 psi.

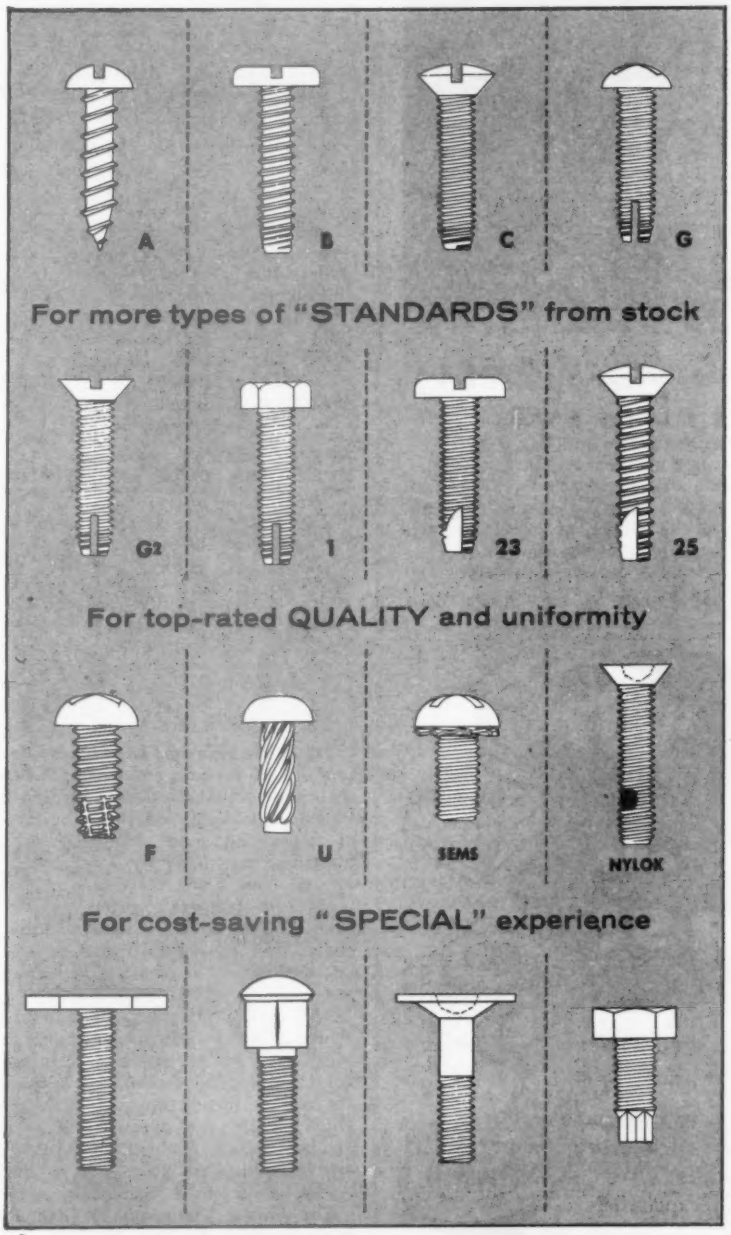
The device consists of a cylindrical plug and a tapered pin. The plug, with a tapered hole in its center, is slip-fit flush into the reamed hole to be sealed. Then the tapered pin is pressed or driven into the plug until the exposed end of the pin is flush.

Edges of the grooves in the outside diameter of the plug bite into the sides of the casting or machined part forming independent seals and retaining rings. The resulting inter-

Count on *Continental* to show you why

you can measure the difference in assembly dollars

when you use the right type for the job



Which fasteners will serve best and save most in your assemblies? Many types of screws look much alike, but the difference between the right and wrong choice for your job can often make a big difference in assembly costs.

Since Continental makes and supplies *all* types, their recommendations are unbiased. They can tell you if you should be using some "standard" you have overlooked. Or, if a "special" will save you most, you can rely on Continental's specialized experience to design and produce it at the lowest possible cost.

CHECK YOUR ASSEMBLIES

Find out where Continental's cost-saving ideas can cut your assembly costs. Talk to a Continental Assembly Specialist. For prompt service, write or phone: Continental Screw Co., 448 Mt. Pleasant St., New Bedford, Mass.

MEMBER SCREW RESEARCH ASSOCIATION

CONTINENTAL

SCREW COMPANY, NEW BEDFORD, MASS.

HOLTITE FASTENERS

HY-PRO TOOL COMPANY... DIVISION
RESEARCH ENG. & MFG., INC. SUBSIDIARY

HOLTITE PHILLIPS AND SLOTTED HEAD
WOOD • MACHINE • TAPPING THREAD CUTTING • HANGER AND STOVE BOLTS • SEMS • NYLOK
HY-PRO PHILLIPS INSERT BITS AND HOLDERS

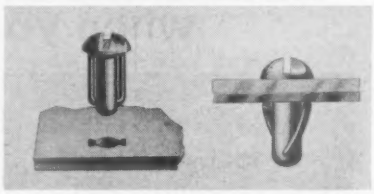
Use postpaid card. Circle No. 242

ference fit will be from .002" to .005".

The Lee Co., Box 418, Westbrook, Connecticut.

Use postpaid card. Circle No. 35

QUARTER-TURN FASTENER FOR BLIND APPLICATORS



A one-piece fastener locks and unlocks with a quarter-turn and is commonly used in blind applications.

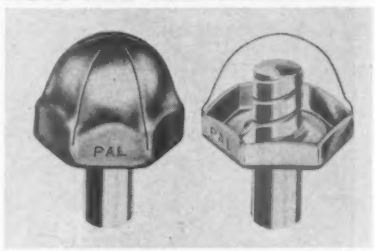
The Spring-Lock is self-adjusting to compensate for various material thicknesses within its range. Permanent installation in outer sheets prevents loss of fastener when panels are removed.

Spring pressure pulls the sheets together. Sheets are locked with a high initial load without deflection.

Simmons Fastener Corp., 1756 N. Broadway, Albany 1, N.Y.

Use postpaid card. Circle No. 36

SPRING STEEL ACORN NUTS ARE SELF-THREADING



An acorn type has been added to a line of self-threading nuts, which form their own threads while tightening on unthreaded studs, rod, wire, or rivets of aluminum, zinc, steel, brass or plastic. Sizes presently available are for ⅛" and 3/16" diameters.

Made of tempered spring steel, the acorn CST nuts have a decorative dome shape that covers the ends of studs or rods to add a pleasing appearance and protect against scratching.

The central opening is a double, coarse pitch thread form which acts like a die in starting and forming a continuous spiral thread impression as the nut is turned down in assembly. High tensile and torque values are claimed, while resilient spring forces assure a vibration-proof grip, whether seated or unseated. Samples.

The Palnut Company, 79 Glen Rd., Mountainside, N. J.

Use postpaid card. Circle No. 37

DRY FILM ADHESIVE FOR METAL, PLASTICS

Dry film adhesive No. 2383 is used as a binding agent for metal, glass, many plastics, cloth, wood and rubber. The adhesive resists aliphatic hydrocarbons, water and petroleum oils.

Dennis Chemical Co., 2701 Papin St., St. Louis, Mo.

Use postpaid card. Circle No. 38

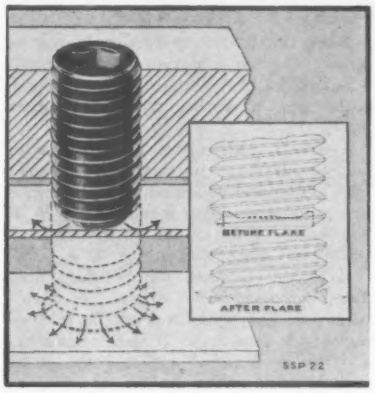
RED RECLAIM ADHESIVE WITH HIGH HEAT RESISTANCE

A red reclaim adhesive is claimed to have high heat resistance. Number 15-287 is capable, for example, of passing through paint retouch ovens without failure. The general purpose cement is used for bonding fibrous material to metal, wood and plastic.

The St. Clair Rubber Co., 440 E. Jefferson, Detroit 26, Michigan.

Use postpaid card. Circle No. 39

FLARED-POINT SET SCREW WILL NOT SHAKE LOOSE



A set screw is formed so as not to shake loose from its mounting when not in use.

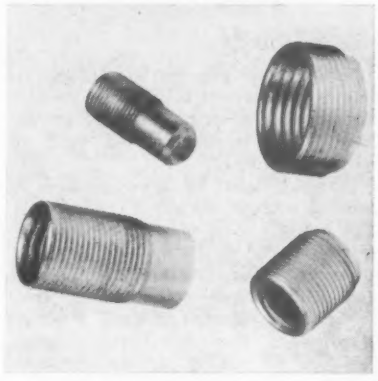
The point of the Flare-Lok set screw flares out when it is tightened against the bearing surface. It is then a tightening or adjusting screw, and will not continue to flare with successive tightenings.

The screw may be removed without damaging mating thread. It is available in most metals in hex, slabbed or slotted heads.

Set Screw & Mfg. Co., Bartlett, Ill.

Use postpaid card. Circle No. 40

THREADED INSERTS FOR SOFT METALS, PLASTICS



A line of self-locking inserts molding metal-to-metal is designed for repairing damaged threads, protecting internal threads in soft metals and plastics and for strengthening assemblies and light castings.

Min. O. Dee (minimum outside diameter) incorporates a 6° tapered root to reform the softer receiving thread to its own contour. The reverse taper

of the cone-like root creates a positive wedging action providing a lock that is said to improve with use since the work-load is carried mainly by the tapered root. This also permits a small outside diameter, yet gives great strength by firmly gripping the surrounding metal through the entire length of the insert.

Lock Thread Corp., 2832 E. Grand Blvd., Detroit 11, Mich.

Use postpaid card. Circle No. 41

ADHESIVES FOR BONDING POLYSTYRENE FOAM

When insulating material polystyrene foam is bonded with two new adhesives it is said to defy separation from steel, aluminum, masonite, wood and other materials.

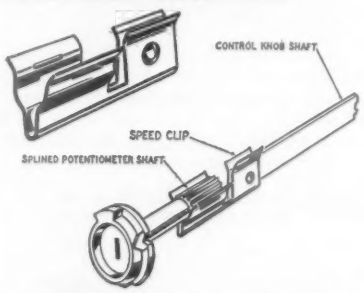
A-827-B adhesive is used with foamed-in-place polystyrene. Assemblies withstand repeated weather cycles involving immersion in water at 120°F, hot water spray at 160°F, dry heat at 160°F and storage at minus 40°F.

R-1083-T is used for bonding prefoamed polystyrene shapes to themselves, to polystyrene sheet or to steel and other materials. This adhesive has no "stress crazing" effect (caused by solvents weakening polystyrene by collapsing the foam).

B. F. Goodrich Industrial Products Co., 500 S. Main St., Akron, Ohio.

Use postpaid card. Circle No. 42

SPRING STEEL CLIP FOR TELEVISION RECEIVERS



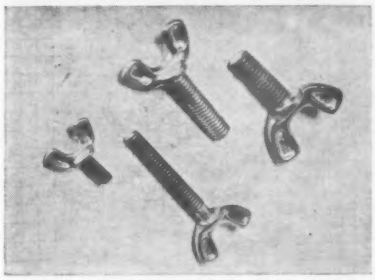
Spring steel clip for application on television receivers is used as a coupler which joins a long, flat steel control knob shaft to the splined shaft of a potentiometer.

Coupling can be accomplished in seconds without the aid of special tools. The control shaft is snapped into the U-shaped end of the Speed Clip where it is locked in position by a spring tab. The splined potentiometer shaft can then be inserted by easily pressing it between the semi-tubular spring legs, or by sliding it into the open end.

The fastener serves an additional safety function. The oblong dimples on its spring legs engage the splined shaft for positive tuning. Once the potentiometer has reached its turning limits, further turning of the control knob results only in slippage of the clip on the shaft as the dimples override the splines. This prevents possible damage to the potentiometer.

Tinnerman Products, Inc., Box 6688, Cleveland, Ohio.
Use postpaid card. Circle No. 43

WING SCREWS CAN AVOID NEED FOR MATING PART



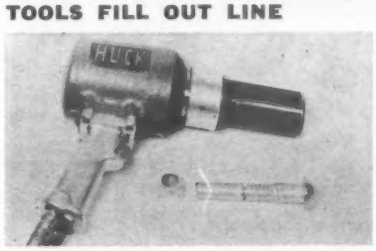
A complete line of wing screws are available in thread sizes from No. 6 through ½", wing spreads of from 27/32" to 1-7/8", and screw lengths ranging from ¼" to 1¾".

Die cast zinc alloy wing screws used in conjunction with a tapped hole in one mating part eliminate the need for a separate nut. Wing screws are also available as two-piece assemblies for higher torque applications.

Quantity permitting, non-standard thread sizes and lengths, as well as special points (cone, cup, dog, oval, etc.) can be specified for both one and two-piece wing screws. The units are bright tumbled to produce an attractive finish and have excellent corrosion-resistance for most applications.

Gries Reproducer Corp., 125 Beechwood Ave., New Rochelle, N. Y.
Use postpaid card. Circle No. 44

LARGER BLIND FASTENERS, TOOLS FILL OUT LINE



Blind fasteners in ⅝" and ¾" nominal pin diameters, together with required installation tooling, are now available and thus extend the line to cover a size range from 3/16" to ¾" The new sizes are currently being produced in aluminum alloy (2024), mild steel (AISI 1038) and stainless steel (300 Series).

Tooling for installing the new fasteners include the model 504 and model 505 hydraulic tools and model 905 Powerig, a portable hydraulic power unit. The 504 tool has a capacity of 16,000 lbs. pull with a 1½" pull stroke. It will install up to ½" mild steel and ⅝" aluminum fasteners. The 505 tool has a capacity of 33,000 lbs. pull with 2" pull stroke. It will install up to ¾" mild steel fasteners.

Huck Mfg. Co., 2480 Bellevue Ave., Detroit 7, Mich.
Use postpaid card. Circle No. 45

HI-FI QUALITY SECURED AT LOWER ASSEMBLY COSTS

Thomson Rivets and Rivet-Setting Machines used by H. H. Scott to standardize fastening procedures.

Any high fidelity hobbyist will tell you that H. H. Scott, Inc., Maynard, Mass., makes America's top quality in high fidelity equipment.

Here you see one of the finest stereo amplifiers made . . . in both chassis and final form. Components are securely and accurately held in uniform tension by 113 Thomson Rivets. H. H. Scott has standardized on Thomson aluminum rivets in one diameter and four lengths.

Rivets get their uniform clinch from any one of the eight Thomson Automatic-Feed Rivet-Setting Machines which H. H. Scott now uses.

All eight machines have identical tooling except for interchangeable anvils. Several sets of numbered, color-coded anvils cover all variations in assembly thickness. Change-over time is a matter of seconds.

E. G. Dyett, Jr., Purchasing Agent of H. H. Scott, reports, "The use of Thomson rivets and rivet-setting machines has produced assembly economies and resulted in lower over-all costs, while improving product appearance and mechanical construction."

Chances are the Thomson Fastening Man can help you improve product quality and reduce your costs. It costs nothing to find out. Make a date with him soon. You'll find him listed in the yellow pages of your phone book. In the meantime, you'll want Thomson's latest catalog. Write today for your free copy to Dept. AS.

Style 161 Thomson Automatic Rivet-Setting Machine

JTL

JUDSON L.

THOMSON

MFG. CO., WALTHAM 54, MASS.

Offices: NEW YORK • ILLINOIS • INDIANA • OHIO • MICH. • PENN. • CALIF. • FLORIDA • TEXAS • S. CAROLINA • MO. • ONTARIO, CANADA.

Use postpaid card. Circle No. 248

USEFUL LITERATURE

To receive your copy of any literature reviewed here, use the postpaid card opposite page 51.

WIRE DRAWERS

"Profits in Cold Heading" is the theme of 12-page Bulletin 111-A which describes a line of wire drawing machines and attachments. Advantages, tensile strength tests, capacities are presented in text and photos. The Ajax Mfg. Co., Euclid Branch P.O., Cleveland 17, Ohio.

Use postpaid card. Circle No. 51

DESIGN MANUAL

Installation techniques for all types of electronic, hydraulic and mechanical harnessing problems outlined in an engineering design manual TA210G. Weight charts, specification data on over 400 standard clamps, line supports, brackets and shims. TA Mfg. Corp., 4607 Alger St., Los Angeles 39, Calif.

Use postpaid card. Circle No. 52

FASTENER STANDARDS

The third edition of **Bolt, Nut and Rivet Standards** brings together recognized dimensional standards for bolts, nuts, studs, screws, washers and rivets. The revised 288-page volume was last published in 1952. Industrial Fasteners Institute, 1517 Terminal Tower, Cleveland 13, Ohio. $3.

Use postpaid card. Circle No. 53

WELD SCREWS

New design features of the Rimguard projection weld screw are discussed in a four-page brochure. Text, photographs, specifications. Better fusion, stronger welds claimed for fastener. Parker-Kalon Div., Clifton, N. J.

Use postpaid card. Circle No. 54

SCREW PACKAGE PRICES

Eight-page Catalogue P-1 contains list prices on packaged wood screws, Type A tapping screws, machine screws, machine screw nuts, stove bolts and carriage bolts. The back cover, inside and out, is filled with color illustrations, descriptions and explanations about the copyrighted "EZ to C" label system. Southern Screw Co., P.O. Box 1360, Statesville, N.C.

Use postpaid card. Circle No. 55

PRESS BOLTS

Installation data and dimensions for a press bolt are presented in two specification sheets and an ad reprint. The fastener has a serrated head and undercut which cause the parent material to "cold flow" and lock the bolt in place. Tapping is eliminated. Rosan Inc., 2901 West Coast Hwy., Newport Beach, Calif.

Use postpaid card. Circle No. 56

WIRE CONNECTORS

Bakelite, porcelain, and set screw wire connectors are among the many electrical and mechanical products cataloged in a 34-page booklet No. 100. Nylon and plastic clamps, snap-straps, masonry drills and anchors, tapping screws and toggle bolts are described and specified. Illustrations. Holub Industries, Inc., Sycamore, Ill.

Use postpaid card. Circle No. 57

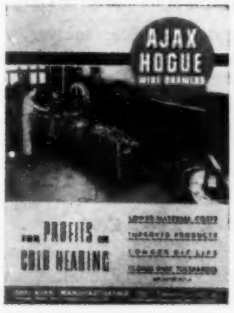
TOOL ENCYCLOPEDIA

"Assembly Tool Encyclopedia" is the title of a 64-page catalog illustrating and specifying a complete line of manual tools and power tool accessories. Drivers or shanks, universal sockets, ratchets and handles, wrenches, stud removers are offered. The Cornwell Quality Tools Co., Mogadore, Ohio.

Use postpaid card. Circle No. 58

CORROSION GUIDE

A 24-page "Corrosion Guide" for fasteners is of value to manufacturers and production engineers. Commonly-used metals are tabulated to show approximate physical and mechanical properties and the suitability for manufacturing applications. There is a cross index for chemically equivalent specifications that cross-references these metals to ASTM, military and Federal



(See 51)

(See 52)

(See 54)

specifications. H. M. Harper Co., 8200 Lehigh Ave., Morton Grove, Ill.

Use postpaid card. Circle No. 59

COLD-HEADED SPECIALS

Specific examples of how designing parts for cold-heading simplified operations and reduced costs are sketched in a 16-page booklet. Illustrations and text describe each case history. A checklist gives data necessary for specifying fasteners. Welding parts and adjusting or leveling screws are also presented. The National Screw & Mfg. Co., 2440 E. 75th St., Cleveland 4, Ohio.

Use postpaid card. Circle No. 60

HIGH PRODUCTION WELDING

Special resistance welding machines for high production runs are pictured and described in six-page Bulletin 5905. Twenty-three machines (spot, projection, seam and flash-but) are featured. Resistance Welder Corp., Bay City, Michigan.

Use postpaid card. Circle No. 61

HYDRAULIC CYLINDERS

Non-rotating, double-acting hydraulic cylinders (2000 psi) are dealt with in 16-page, hardcover Catalog 4. Design features are pointed out in a full-page cross-sectional drawing, followed by engineering data on eight types of mounts. Clevises, mounting brackets are specified and two tables list standard and 2:1 rod pressures. Lynair Inc., 3100 E. Michigan, Jackson, Mich.

Use postpaid card. Circle No. 62

TIME-SAVING ACCESSORIES

A 14-page brochure consists of enlarged, captioned photos showing a line of tooling accessories for jig, fixture and die set-ups in use—in original equipment and as new, time-saving devices. Fixture keys, spring and ball plungers, swivel-pad clamps, thumb screws, stops, toggle pads are described. Vlier Engineering Corp., 8900 Santa Monica Blvd., Los Angeles 46, Calif.

Use postpaid card. Circle No. 63

SPECIAL FASTENING TOOLS

A series of four catalogs cover nut running, screwdriving and miscellaneous fastening tools. Special sockets and wrenches for difficult applications, magnetic bit holders, extensions, adapters, power bits, hand drivers, friction chucks are treated with photos, drawings and large, easy-to-read specifications. The Apex Machine & Tool Co., 1025 S. Patterson Blvd., Dayton 2, Ohio.

Use postpaid card. Circle No. 64

DRAFTING EQUIPMENT

New products and improvements in established lines feature attractive 24-page catalog GC-59. Newest member of the line is the Staktube roll file, a "file & find" storage system for large rolled blueprints, charts, drawings, maps and tracings. Also included are flat drawer files and drawing and drafting tables and equipment. Equipment is constructed of steel and selected woods. Stacor Equipment Co., 295 Emmet St., Newark, N. J.

Use postpaid card. Circle No. 65

101 WRENCHES

A complete line of hand wrenches for radio and electronic assembly work is outlined in two color, 20-page Catalog 1. Socket, ratchet, hexhead, offset, internal and many other types are illustrated and sized. Both singles or sets available. Stevens Walden, Inc., Worcester, Massachusetts.

Use postpaid card. Circle No. 66

RIVET APPLICATION

Two-piece rivet application is helpfully presented in cartoon and text fashion in a 60-page pocket-sized manual. All phases of rivet selection, hole preparation, installation, troubleshooting and inspection are treated. Six pages of charts specify available fasteners. Hi-Shear Rivet Tool Co., 2600 W. 247th St., Torrance, Calif.

Use postpaid card. Circle No. 67

STUDS AND HEX NUTS

Alloy stud and high carbon hex nuts properties are presented in a four-page brochure. Information is listed on standard, special and stainless steel grades with recommendations for various service conditions. Bolt and Nut Div., Republic Steel Corp., 1441 Republic Bldg., Cleveland 1, Ohio.

Use postpaid card. Circle No. 68

ALUMINUM FASTENERS

Aluminum standard fasteners are catalogued in eight-page Form 19-10244; bolts, screws, nuts, rivets, nails, thumb screws, cotter pins and special parts. Special crew machine product made to specifications are also pictured. Aluminum Co. of America, 1221 Alcoa Bldg., Pittsburgh 19, Pa.

Use postpaid card. Circle No. 69

SELF-SEALING FASTENERS

A 12-page file-folder covers a line of single-unit, high-pressure seals and fasteners. Indexed Catalog 359 lists military specifications, features and applications for Hexseals (toggle switch boots, rotary shaft seals, push button switch boots), Seelskrews, Seelbolts and Seelrivits. A.P.M. Sales Corp., 252 Hawthorne Ave., Yonkers, N.Y.

Use postpaid card. Circle No. 70

WALL CHART

Multi-colored wall chart 16"x23" lists decimal equivalents from 1/64th to 1. Facilities for cold-heading parts also introduced. John Hassall, Inc., Westbury, L. I., N. Y.

Use postpaid card. Circle No. 71

FLUID COUPLING NUT

Vibration-resistant coupling nuts for fuel lines are self-locking and available in two series for applications up to 800°F. Four-page Form 2488 cover the nut's features, list specifications and give test performance results. Standard Pressed Steel Co., Jenkintown, Pa.

Use postpaid card. Circle No. 72

QUICK RELEASE FASTENERS

Pioneer development of the "quarter-turn" fastener is told in a two-color, four-page brochure. Varieties of spiral cam parts are shown in typical application and principles of design discussed. Dzus Fastener Co., Inc., Babylon, N. Y.

Use postpaid card. Circle No. 73

EYELETTING MACHINE

Automatic eyeletting of wire leads at increased production rates is described in a one-page circular. Specifications and use of the Model G eyeletting machine for producing terminals are given. United Shoe Machinery Corp., 140 Federal St., Boston 7, Mass.

Use postpaid card. Circle No. 74

ADHESIVES

Product information sheets (10) describing adhesives for bonding polystyrene to various construction materials fill an 8½" x 11" folder. Properties, uses, application are fully explained. Adhesives Sales Div., The B. F. Goodrich Co., Akron 18, Ohio.

Use postpaid card. Circle No. 75

QUICK RELEASE PINS

Two spring-loaded ball type quick release pins are specified in a two-page flyer. Dimensional drawings, shear strength by materials and typical applications are listed. Aerofast, Box 324, Wheaton, Illinois.

Use postpaid card. Circle No. 76

REVERSIBLE DRIVERS

Two-directional power is available in three series of reversible screwdrivers and nut runners. An indexed, pocket-sized folder describes a complete line of air and electric power tools, including stall torque wrenches and multiple spindle drivers. Buckeye Tools Corp., Dayton 1, Ohio.

Use postpaid card. Circle No. 77

AIRCRAFT HARDWARE

Facsimile blueprints fill a 28-page folder which presents specially-designed aircraft hardware. Anchor, channel, shim nuts, panel bolts, hangers, terminal board bus, clamps are dimensionally drawn and specified. Wm. H. Snow Co., 1413 E. Franklin Ave., El Segundo, California.

Use postpaid card. Circle No. 78

LOCK NUT DESIGN MANUAL

Nine typical fastening problems are presented and solved by the selection of the proper type of self-locking nut. Fourteen-page Bulletin 5613 introduces three styles of a lock nut employing an elastic collar. Capacities, applications, service approvals and ordering data are given. Elastic Stop Nut Corp. of America, 2330 Vauxhall Rd., Union, New Jersey.

Use postpaid card. Circle No. 79

RESISTANCE WELDERS

Two catalogs totaling 52 pages present a complete line of spot and butt welders, and equipment. Bench and pedestal type models are pictured and described. Soldering and brazing machines are also manufactured. Eisler Engineering Co., Inc., 750 S. 13th St., Newark 3, N. J.

Use postpaid card. Circle No. 80

AUTOMATIC DRILL UNIT

Model 505, a heavy-duty automatic drill unit, is attractively presented in a six-page, two-color folder. Fourteen features are listed and explained. Spindle speed range from 580 to 14,370 rpm. Hydraulic attachment. Completely specified. Batchelder Engineering Co., Springfield, Vt.

Use postpaid card. Circle No. 81

NEW LOCKNUT CONCEPT

Nuts and screws with curved teeth bases are designed to give uniform torque-tension and a high "break-loose" torque in relation to application torque. The free-spinning Whiz-lock is described in a four-page brochure. MacLean-Fogg Lock Nut Co., 5535 N. Wolcott Ave., Chicago 40, Ill.

Use postpaid card. Circle No. 82

SCREW PACKING CHART

A new bulk packing chart, BP-2, gives complete information on a packing and palletization system designed for large or small users of bulk screws. Where screws are used or moved in small bulk quantities, the 9" x 9" x 6½" carton is easily handled as it weighs about 45 lbs. For handling large quantities of bulk screws, Southern provides a disposable 2-way entry pallet on which are steel strapped 36 of the cartons. Southern Screw Co., Box 1360, Statesville, N. C.

Use postpaid card. Circle No. 83

THREE-PHASE WELDERS

How three-phase welding solves power problems is told in eight-page Bulletin 318-1. Two machines, SPT-2 spot welder and EPT-2 projection welder, are introduced. The air-operated, press-type welders are pictured, accompanied by performance charts and technical data. Sciaky Bros., Inc., 4915 W. 67th St., Chicago, Ill.

Use postpaid card. Circle No. 84

LOCKING PIN DESIGN

Designers will be interested in a 28-page handbook on locking pins and drive studs. The grooving principle is explained, diagramatic examples of typical applications for various types of press-fit pins shown, each accompanied by specifications of standard sizes. Test report data aids selection. Groov-Pin Corp., 1125 Hendrick Causeway, Ridgefield, N. J.

Use postpaid card. Circle No. 85

WELDING DATA SHEETS

Folder of assembled production data sheets is helpful in selecting proper machines for spot and flash welding. Separate recommendations for commercial, aircraft, automotive and job use on the basis of materials, desired production, quality. Thompson Electric Welder Co., 161 Pleasant St., Lynn, Massachusetts.

Use postpaid card. Circle No. 86

THREADED RODS TO 60"

Four-page Bulletin 550 outlines facilities for manufacturing threaded rods and bolts from 4" to 60" in length. Special cold-headed fasteners, chair and ladder rods, studs, thru bolts are pictured. The Ohio Rod Products Co., Inc., 20251 First Ave., Berea, Ohio.

Use postpaid card. Circle No. 87

CONVEYOR REPORT

Use of a tray conveyor system to provide storage of parts in process and their quick withdrawal for continuous operations is featured in a technical report. The case history details how one system satisfies a need to index, store, circulate, and deliver on demand a large variety of components and to fulfill a new concept of batch coordination. Other handling innovations are represented by a flow diagram and a sequence of 10 photographs. Gifford-Wood Co., Hudson, N. Y.

Use postpaid card. Circle No. 88

COLD-HEADING MACHINERY

Cold-heading for cutting fastener manufacturing costs is the subject of flyers and other literature. Machines to cold-head nuts, bolts and other parts are pictured and described. Production ranges from 40 to 450 parts per minute. Design service available. National Machinery Co., Tiffin, Ohio.

Use postpaid card. Circle No. 89

INSTRUMENT COMPONENTS

Catalog 20 consolidates all previous catalogs specifying instrument and tool components: gears, clamps, washers, nuts, screws, wheels, shafts. The 418-page pocket-sized catalog has dimensional drawings and engineering data for each item. PIC Design Corp., 477 Atlantic Ave., East Rockaway, N.Y.

Use postpaid card. Circle No. 90

ALUMINUM WELDING

The importance of filler wire surface quality in high strength aluminum welding is emphasized in a booklet. Availabilities, sizes, tempers of aluminum welding wire are given. The Dalweld Co. Inc., 11 Bertel Ave., Mount Vernon, New York.

Use postpaid card. Circle No. 91

CUSTOM FASTENERS

Engineering data sheets are inclosed in a file folder, describing hour glass (hairpin) fasteners, flat spring and custom screw machine fasteners, special application nuts and retaining rings. No catalog items, custom service outlined. Stanley-Humason, Inc., Forestville, Connecticut.

Use postpaid card. Circle No. 92

SOCKET SCREWS

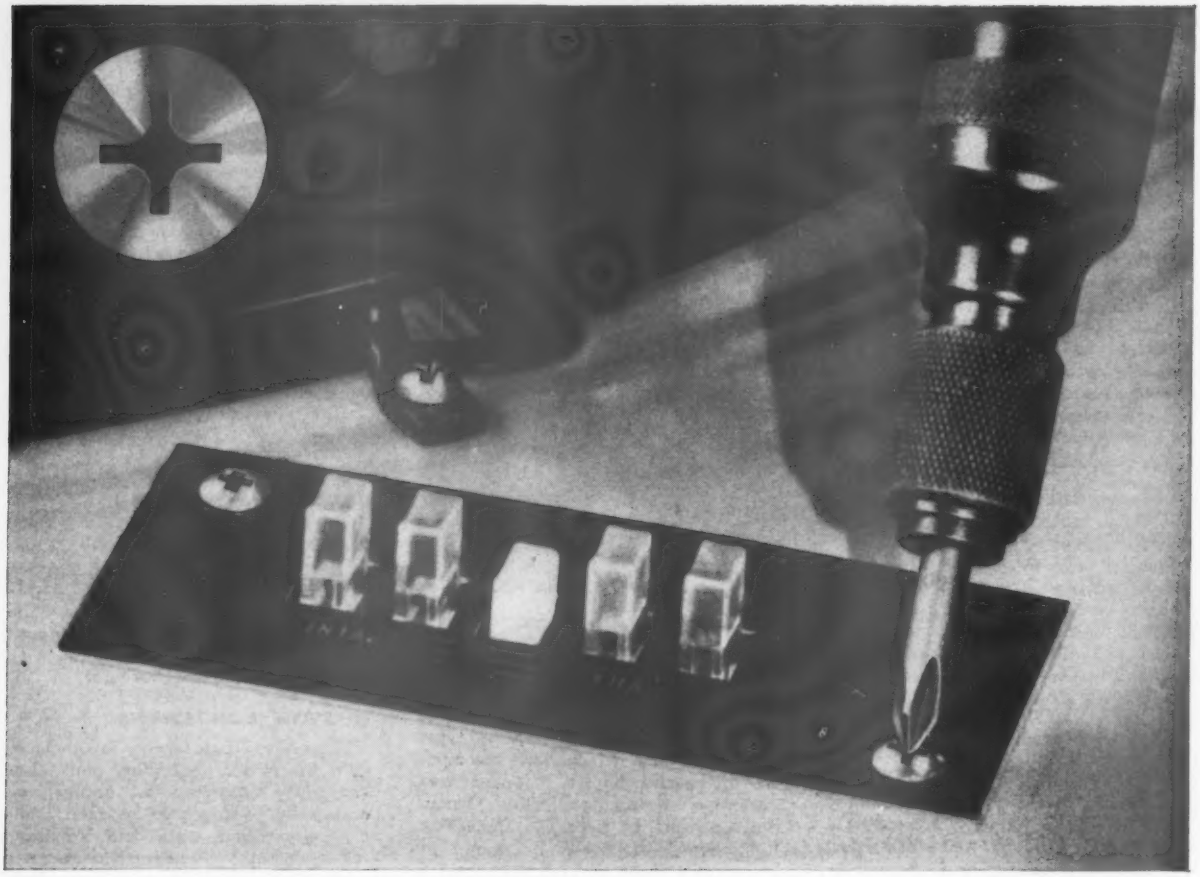
Punched, two-color Catalog 765 details a complete line of socket screws, including photos of a 17-step quality control program. Hex, multiple-spline set and cap screws, socket and flat head cap screws, hex socket shoulder screws, pipes plugs, and button head socket screws, plus accessories and kits, are specified, Miniatures for electronics are described with new design standards. The Bristol Co., Waterbury 20, Connecticut.

Use postpaid card. Circle No. 93

PROTECTIVE COATING

A removable coating protects against rust, abrasion, corrosion for metal parts and tools. Description of Thermo-Cote is contained in four-page Brochure 457 showing step-by-step dipping application and specifying types available. Bischoff Chemical Corp., Ivoryton, Conn.

Use postpaid card. Circle No. 94



PHILLIPS SCREWS...the fastener with a plus!

Continuing Product Improvement (A few more of the design changes in Phillips screws)

- Introduction of #0 Phillips recess sizes to cover miniature screws and #5 recess to cover 5/8" and 3/4" diameter screw sizes.
- Decrease of nose angle on Phillips driver from 28° to 18°, to prevent driver interference at its tip, improves fit and quality.
- The establishment of improved wing clearance between surfaces of recess and driver bit to favor best driveability.

improve appearance, permit design freedom

If product appearance is an important consideration to you, as it is in the design and assembly of most products, compare Phillips cross-recessed-head design with other types of fasteners.

With Phillips screws, because of the perfect alignment of the cross recess and driver, there's no danger of the driver slipping and marring surfaces . . . even with power drivers. Also there's no unsightly burring or splitting of screw heads.

There is no difficulty in driving Phillips screws in awkward positions. They may be located wherever design and appearance considerations dictate.

Improved appearance is only one reason for specifying high quality Phillips cross-recessed-head screws. Their ability to speed production, reduce costs and provide greater holding power accounts for the widespread usage of Phillips screws by so many manufacturers in every major industry.

Constant product improvements (see box) also benefits you. Phillips famed cross-recess is made in every type of head configuration to a universal standard by leading fastener producers in every section of the country. On your fastening jobs, specify Phillips screws. 92

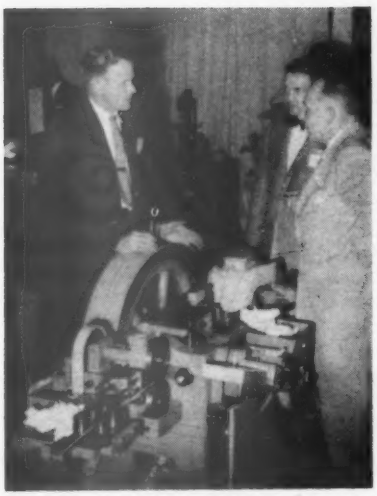
SCREW RESEARCH ASSOCIATION

(Licensed Manufacturers of Phillips Screws and Drivers)

PHILLIPS CROSS-RECESSED-HEAD SCREWS . . . THE FASTENER WITH A PLUS

Use postpaid card. Circle No. 249

INDUSTRY MAKES NEWS



Examining a solid die double stroke cold header at the Morris Tool Show are (left to right) Paul F. Pick, chief engineer of Allen Mfg. Co.; R. E. Morris, the show's host; and Paul W. Klooz, vice president for manufacturing, Holo Krome Screw Corporation.

U.S. Navy aviation electronics technicians learn by doing in shop of Beech Aircraft's military training school. The technicians are learning the operation and maintenance of a new weapons target.

COLD HEADERS EXHIBITED AT TOOL SHOW

The first public demonstration of three European-built cold heading machines for the manufacture of miniature parts was held at the recent Robert E. Morris Co. machine and tool show in West Hartford, Connecticut.

The Morris-Omega machines are designed for making electrical contacts, electronic components and fasteners.

Also demonstrated during the three-day show were the Boyar-Schultz precision lead screw tapper and the Scully-Jones safe torque tap driver with a clutch which prevents tap breakage.

BEECH TEACHES NAVY TARGET ASSEMBLY

In classrooms where 15 years ago children were taught the three Rs, instructors of the Beech Aircraft military service section, Wichita, Kans., are teaching classes of U. S. Navy and civil service personnel in the technical operation and maintenance of military products.

Classes are being held in a former World War II Beechwood school where 20 Navy men are taking the four-week factory training course for the KDB-1 target aircraft. The 600 lb. target will be used for surface-to-air and air-to-air weapons system evaluation and training.

Students learn by the bench check of parts and components and assembly and disassembly of the complete target. The 150 hours of instruction are divided into 60 hours in the classroom and 90 hours in the shop.

REVISED BOOK LISTS FASTENER STANDARDS

Bolt, Nut and Rivet Standards, third edition, has been enlarged and revised. The 288-page volume includes all current engineering standards for bolts, nuts, studs, screws (machine-, cap-, tapping-, wood-), washers and rivets. The previous edition was published in 1952.

Use information includes fastener specifications and standards, grade markings, locknut specifications, terminology, unified screw thread standards and other data.

continued

Copies are $3 from the Industrial Fasteners Institute, 1517 Terminal Tower Cleveland 13, Ohio, which gathered, organized and published the material.

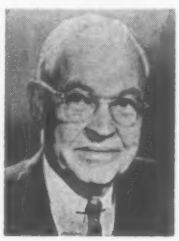
ZENITH V-P NAMED "SALES EXEC. OF 1958"

Leonard C. Truesdell, Zenith Radio Corporation's executive vice president in charge of marketing, was named "Sales Executive of the Year" at the 30,000-member National Sales Executives International convention in New Orleans.

Truesdell joined Zenith in 1949, was elected vice president and director of sales in 1955, was made a director in 1959 and named to his present position in April. He has also been with Hotpoint, Bendix-Aviation and the Frigidaire division of General Motors.

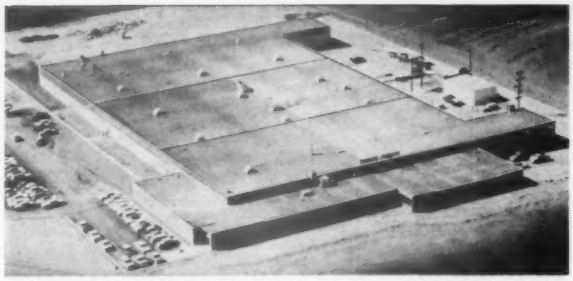
In the presentation, Truesdell was cited for ". . . demonstrating unusual ability in selling quality over price. During the recession year 1958 he established a new record in production and shipment of television receivers, increasing sales more than 15% above the previous record year of 1957 . . ."

RB&W ELECTS DAVEY SALES VICE PRES.



John S. Davey has been elected vice president in charge of sales for Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, N.Y.

Davey has served R B & W in executive engineering, marketing and production capacities for 30 years, most recently as vice president in charge of research and engineering. Davey joined R B & W in 1929 after serving as an engineer with The Babcock & Wilcox Company.



THE TOMKINS-JOHNSON CO., Jackson, Michigan, producers of milling cutting tools, air and hydraulic cylinders and riveting machines, recently moved into its new manufacturing and office facilities in Jackson. The plant is situated on a 13-acre plot comprising 114,000 sq. ft. of building space.

R.W.M.A. WELDING ORDERS UP 31 PERCENT

New orders for resistance welding machines and equipment received by the 16 members of the Resistance Welder Manufacturers' Association during the first four months of 1959 were 31% ahead of a similar 1958 period.

Business has been coming in at a rate of $2½ million per month and for the third consecutive month, members reported backlogs of better than $7½ million.

GRENBERG TO DIRECT NATIONAL LOCK SALES

Bert A. Grenberg, industrial hardware sales manager for the past 20 years, has been named director of sales of the Industrial Division, National Lock Co., Rockford, Ill.

Jerry W. Eklund, former industrial hardware salesman, has been promoted to succeed Grenberg as sales manager, cabinet hardware.

continued

HUCK EXPANDS WESTERN BRANCH

Huck Mfg. Co. has moved its Western Branch to new and larger facilities in suburban Los Angeles, according to an announcement from Mr. A. W. Armour III, Huck's president.

The new building at 220 N. Daphne in Hawthorne, Calif., provides more than double the space formerly occupied by the branch at its Inglewood location. This is the second expansion for Huck's western operation in less than three years.

MULTIFASTNER ADDS DESIGN ENGINEER

Multifastner Corp. of Detroit has added Martin K. Zurn as technical assistant to the president, Jerry H. Steward. Formerly staff engineer with the Don W. Kelsey Co., Zurn will be responsible for new development and design of automation equipment for the company's fastening devices.

TAYLOR BROS. TO HANDLE STANSCREW LINE

Standard Screw Company has appointed Taylor Brothers, Richmond, Va., sales representative for its Stanscrew line. Taylor Brothers has represented Standard's Hartford Machine Screw Company Division for 46 years and will now also represent The Western Automatic Machine Screw Division, Elyria, Ohio, and The Chicago Screw Company Division, Bellwood, Ill.

BLACK & DECKER OPENS NEW N.Y.C. BRANCH

A second Black & Decker Mfg. Co. factory service branch has been opened in New York City, at 227 Varick St. Under the direction of Walter Trapp, manager, and Dan E. Calabrese, assistant branch manager, the center will stock replacement parts.

TWO MOVE UP IN SALES POSTS AT SPS

BETZ

MORRIS

Charles J. Betz has been named manager of outside sales of industrial fasteners by Standard Pressed Steel Co., Jenkintown, Pa. Donald J. Morris, formerly Texas district sales manager succeeds Betz as inside sales manager for the industrial fastener lines.

Betz joined SPS in 1940 and served in production, methods, customer service and sales posts before becoming manager of inside sales of socket screw products in 1953. He was named inside sales manager of all industrial fastener lines in 1958.

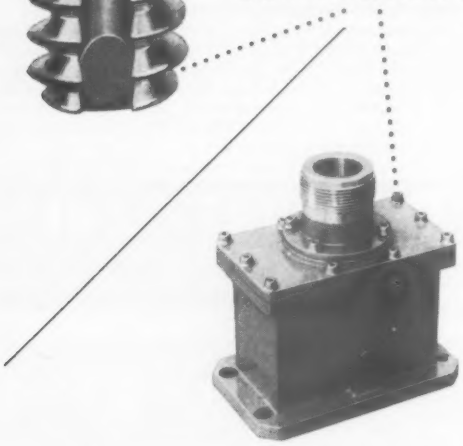
Morris has been with SPS for 22 years. He served as production expediter, methods man and customer service representative before going out in the field as salesman in the Detroit territory in 1951. He was named Texas district sales manager in 1957.

PAPER TELLS OF BRAZING IN MISSILERY

The use of multiple brazing processes for precision assembly of complex, lightweight, strong metal components will figure prominently in the building of advanced missile and space vehicle structures, members of the American Welding Society were told recently.

Describing this metallurgical joining process were George D. Cremer, senior staff engineer, and Richard S. Mueller, research engineer, Solar Aircraft Company.

"LONG-LOK® self-locking screws eliminated damaged recesses in assembling our waveguides"...*says Tamar Electronics.*



This nationally known specialist in electronic countermeasures found that the gradual torque build-up of LONG-LOK Self-Locking Screws prevented destructive torque impact when using pneumatic or power drivers.

LONG-LOK Self-Locking Screws also eliminated lockwire and lock washers.

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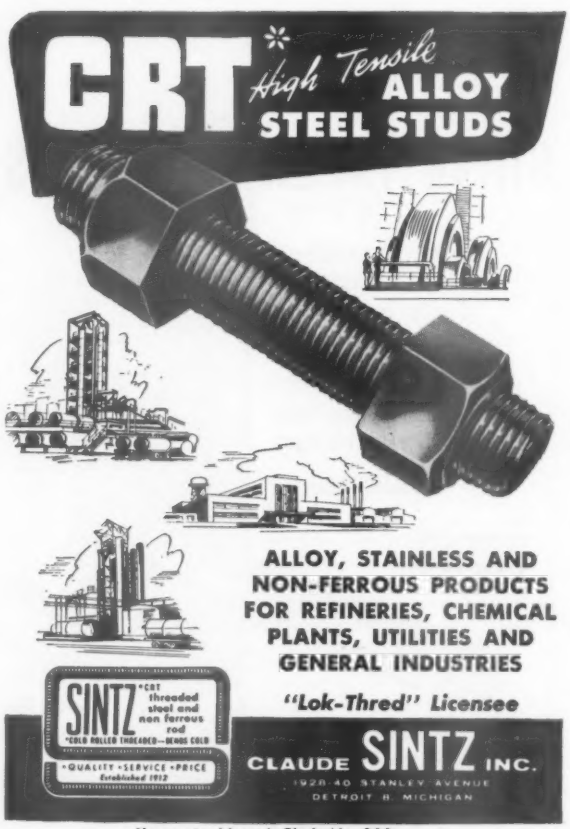

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CONTENTS IN THIS ISSUE

Don't overlook these articles

FEATURES

24—Muffle Noise and Boost Efficiency
Here's how Duncan Electric avoids trouble due to high noise levels.

28—Let's Consider Solid Pins
Applications of straight, tapered and grooved pins in product design.

33—Application of Weld Fasteners
Second of two articles covers joining methods and equipment.

39—Fasteners Serve as Components
Spring steel clips serve multi-purpose in TV step-tuner.

42—Semi-Automatic Assembly Line for Computer Circuitry
Librascope develops technique which permit production rates formerly thought unobtainable.

46—Fastener Specialist School
Parker-Kalon distributor salesmen get both theoretical and practical experience in problem solving.

49—Painted Fasteners in Product Design
Fasteners are now available for color-matching and color-coding.

IDEAS AND REPORTS

15—Productive Ideas with Conveyors
Use of dividing bars on conveyor belt aids assembly of miniature parts at British company.

16—Cut Brazing Time by 20 Percent
Raytheon combines induction heating with new brazing facilities.

18—Die Cast Studs Effect Savings
Tiny stampings and machined parts for Clarostat switches are replaced with die castings.

19—How About Ultrasonic Inspection?
Report compares ultrasonics with x-ray for weld inspection.

21—Adhesive Bonding of Timing Gears
Haydon saves $56 per thousand in joining pinion gears to rotor shafts.

21—Carbide Tapped Holes Speed Stud Installation
Tap life increased from 18 holes maximum to over 10,000 holes.

23—Electron Beam Welds Super Alloys
New type welder utilizes the energy of a focused beam of high velocity electrons.

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INDEX TO ADVERTISERS

ACCURATE THREADED FASTENERS, INC. 46
AIRCRAFT QUALITY FASTENERS, INC. 12
AMERICAN MACHINE & FOUNDRY COMPANY (THOMPSON-BREMER COMPANY DIV.) 75
AMERICAN SCREW COMPANY 55
ANCHOR FASTENERS, INC. 54
APCO MOSSBERG COMPANY 75

BARTITE PRODUCTS CORPORATION (SUB. OF L. J. BARWOOD MANUFACTURING COMPANY, INC.) 8
BATCHELDER ENGINEERING COMPANY 66
BOOTS AIRCRAFT NUT CORPORATION 3rd COVER

CENTRAL SCREW COMPANY 2
CHICAGO RIVET & MACHINE COMPANY 18
CONTINENTAL SCREW COMPANY 63
COOK & CHICK COMPANY 76

DETROIT POWER SCREWDRIVER COMPANY 60

EASTERN MACHINE SCREW CORPORATION, THE 64
EASTERN STATES SALES COMPANY 66
EATON MANUFACTURING COMPANY (RELIANCE DIVISION) 50
ELASTIC STOP NUT CORPORATION OF AMERICA 9
ELCO TOOL & SCREW CORPORATION 74

FEEDMATIC-DETROIT, INC. 79
FEMCO MANUFACTURING COMPANY 76
FISCHER SPECIAL MANUFACTURING COMPANY 67

GENERAL AMERICAN TRANSPORTATION CORPORATION (PARKER-KALON DIVISION) 14
GILLEN COMPANY, JOHN 77
GREER STOP NUT COMPANY 22
GRIP NUT COMPANY 56

HUBBELL INC., HARVEY 16
HUCK MANUFACTURING COMPANY 19

ILLINOIS TOOL WORKS (SHAKEPROOF DIVISION) 41

JACOBSON NUT MANUFACTURING CORPORATION 78

KEYSTONE STEEL & WIRE COMPANY 17
KLINCHER LOCKNUT CORPORATION 47

LAMSON & SESSIONS COMPANY, THE 4
LONG-LOK CORPORATION 78
LUCAS-MILHAUPT ENGINEERING COMPANY 79

MACLEAN-FOGG LOCK NUT COMPANY 32
MCLAUGHLIN COMPANY 64
METTLER MACHINE TOOL, INC. 79
MILFORD RIVET & MACHINE COMPANY 20
MINNESOTA MINING & MANUFACTURING COMPANY 61
MOORE INC., GEORGE W. 77
MOUNT CLEMENS METAL PRODUCTS COMPANY 77

NATIONAL LOCK COMPANY 44

OHIO NUT & BOLT COMPANY, THE 53
OHIO ROD PRODUCTS COMPANY, INC. 74

PALNUT COMPANY, THE 62
PARKER-KALON DIVISION (GENERAL AMERICAN TRANSPORTATION CORPORATION) 14
PHEOLL MANUFACTURING COMPANY, INC. 2nd COVER
POSITIVE LOCK WASHER COMPANY 23
PROGRESSIVE MANUFACTURING DIVISION (THE TORRINGTON COMPANY) 49

RELIANCE DIVISION (EATON MANUFACTURING COMPANY) 50
REPUBLIC STEEL CORPORATION 47
ROCKFORD SCREW PRODUCTS COMPANY 66A-F
ROSAN, INC. 3

SCREW RESEARCH ASSOCIATION 72
SET SCREW & MANUFACTURING COMPANY 76
SHAKEPROOF DIVISION (ILLINOIS TOOL WORKS) 41
SIMMONS FASTENER CORPORATION 57
SINTZ, INC., CLAUDE 78
SOUTHCO DIVISION (SOUTH CHESTER CORPORATION) 6
SOUTHERN SCREW COMPANY 10
STANDARD PRESSED STEEL COMPANY 4th COVER
STANDARD SCREW COMPANY 58
STAR EXPANSION INDUSTRIES CORPORATION 65
STAR STAINLESS SCREW COMPANY 79
STURTEVANT COMPANY, P. A. 56
SWEENEY MANUFACTURING COMPANY, B. K. 40

THOMPSON-BREMER COMPANY (DIV. OF AMERICAN MACHINE & FOUNDRY COMPANY) 75
THOMSON MANUFACTURING COMPANY, JUDSON L. 68
TINNERMAN PRODUCTS, INC. 13
TOMKINS-JOHNSON COMPANY 45
TORRINGTON COMPANY, THE (PROGRESSIVE MANUFACTURING DIVISION) 49

WALDES-KOHINOOR, INC. 38
WATERBURY-FARREL MACHINE & FOUNDRY COMPANY, THE 48

ONE LAST WORD

SPECIALIZED RESPONSIBILITY REQUIRES SPECIALIZED READING

In the July issue we wrote about change and the bewildering complexity of our modern industrial world. One of the important effects of this complexity has been the birth of the specialist as well as the development of a group of engineers and production executives who have embraced one phase of the production or engineering process as their primary area of specialized responsibility. This, in turn, has led to further action in a totally different sphere: that of publishing. It was inevitable that specialized information on fastening and assembly processes be requested by those who made this field their major responsibility, and so ASSEMBLY and FASTENER ENGINEERING was born to help serve their special needs.

The launching of a specialized technical magazine does not mean that other publications are not doing their job! American industry owes much of its progress to its splendid general technical press and it would be presumptuous for anyone to belittle its vitality and excellence. The admission of the excellence of the general technical press is not often returned in kind. Some members of the general press, imagining an encroachment on their exclusive domain, or translating the launching of a specialized publication as a direct criticism of their sketchy coverage of the specialized field, are quick to throw stones. This is unfortunate. Our industrial world is technologically rampaging onto new prairies at breakneck speed, and specialized charts and maps must be provided.

There is still another slant on this specialized responsibility which concerns all industry. This is the staggering rise in non-productive labor in relation to the minor increase in productive labor. Depending on the industry, it is safe to say that a 50% increase in non-productive labor has taken place in the last ten years as against a mere 10% rise in productive labor. Our figures are general and do not relate specifically to one industry. In the chemical industry, for example, which is especially automation-conscious, the increase has been 75% non-productive and 5% productive labor in the years 1947-57. This growth has made specialized responsibility mandatory.

Ten years ago, the average engineering department did not have sufficient manpower to assign men to projects, studies, to "look into things", to keep abreast of all the new ideas, products, methods and techniques. And, generally, continuing specialized information was not available. Today's specialized technical press is an inevitable result of our technically changing world.

Wm. J. Schleicher

Vice President & Editorial Director

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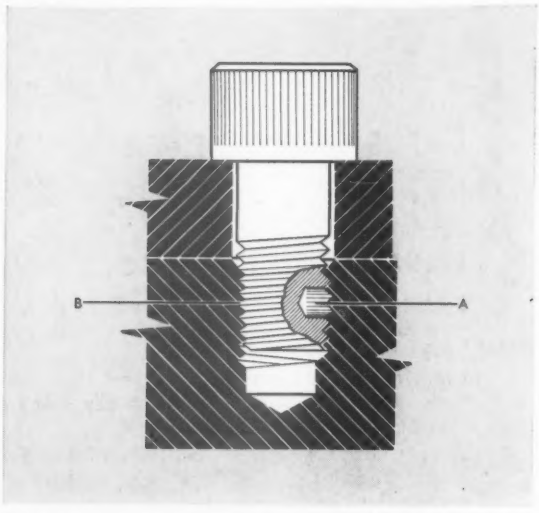
Self-locking UNBRAKO socket screws, in a full range of standard types and sizes, are stocked by your authorized SPS distributor. Permanently installed locking pellets are serviceable from −70 to +250°F and will not dry out, rot or shrink, are not affected by age or fungus.



How Nylok locks: Resilient nylon pellet (A) sets up lateral thrust, smoothly wedging mating threads together (B). Locking action is entirely on threads and is positive, seated or unseated. UNBRAKOs with Nylok are easy to remove and are reusable.

Regular screws loosen under vibration because external stresses cause marked variations in screw tension, resulting in motion between mating threads and loss of frictional holding power.

UNBRAKO socket screws with Nylok stay put, because they do not depend on screw tension to keep them tight. Here is how they work: A tough, resilient nylon pellet, inserted permanently in the threaded section of the screw, is the locking medium. Before assembly, the locking pellet projects slightly beyond the crest of the thread. When mating threads are engaged, it is compressed. Its springlike wedging action grips threads tightly and sets up a counterthrust, creating a strong metal-to-metal engagement of the mating threads. Locking is positive whether the screw is seated or not. And the permanently installed nylon locking pellet retains strength characteristics from −70 to +250°F.

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